# NAVY CIVIL ENGINEER

Ready-made housing enroute to Adak, Alaska

SPECIAL FEATURE

**Seabee Journal '81**

PAGES 31-46

Basic CEC Officers Class No. 159

Graduated 5 June 1981

# 27 new faces for the Civil Engineer Corps

. . . graduating from the Naval School, Civil Engineer Corps Officers, Port Hueneme, Calif., the newly commissioned officers heard Capt. John J. Shanley, Jr., CEC, USN, commanding officer of the Construction Battalion Center, deliver their graduation address. Assisting Capt. Shanley in the presentation of diplomas was the school's commanding officer, Capt. Fred G. Kelley, CEC, USN. Outstanding graduate (indicated by (★) was LT Steven W. Johnson. Students graduating with distinction are indicated by (•) and those entering Seabee duty by (†).

★ **LT Steven W. Johnson**
BS Naval Arch./USNA
to San Diego, Calif.

**ENS Kenneth C. Alexander**
BS Chem. Engrg./NC State
to Washington, D.C.

† **ENS Kurt A. Altvater**
BSEE/Cal State
to Port Hueneme, Calif.

† **LT John L. Ball**
BCE/Georgia Tech.
to Gulfport, Miss.

† **ENS John D. Belanger**
BS Chem. Engrg./U. of Oregon
to Port Hueneme, Calif.

**ENS Charles I. Buechele**
BSEE/U. of Fla.
to Newport, R.I.

† **ENS Jack D. Caldwell**
BA Eng./San Diego State
to Memphis, Tenn.

**ENS Mark T. Corcoran**
BS Chem. Engrg./U. of Maine
to Naples, Italy

• **ENS Robert W. Eadie**
BS Marine Engrg./USNA
to New Orleans, La.

† **CWO2 Randall M. Hass**
to Pensacola, Fla.

**ENS Charles D. Johnson, Jr.**
BSCE/U. of Ala.
to Pensacola, Fla.

• **CWO2 Frederick H. Jordan, Jr.**
to Diego Garcia, I.O.

**ENS Leroy E. Mault, Jr.**
BSCE/Ohio State
to Long Beach, Calif.

† **LT William M. Mengel**
BA Arch./U. of Penn.
to Gulfport, Miss.

**ENS Michael J. Mundy**
BSEE Power/U. of Ill.
to Little Creek, Va.

**ENS Thomas D. Murray**
BEE/Auburn
to Jacksonville, Fla.

† **ENS Robert S. Newman**
BSCE/U. of Fla.
to Port Hueneme, Calif.

**LTJG Samuel J. Pena**
BSCE/U. of Miami
to Rota, Spain

†• **ENS David C. Phillips**
to Twentynine Palms, Calif.

**ENS Gary N. Pirtle**
BSCE/U. of Ala.
to San Diego, Calif.

† **CWO2 Lloyd C. Rees**
to New London, Conn.

**ENS Robert R. Saltsman**
BSME/U. of Fla.
to Seal Beach, Calif.

**ENS Sharon L. Smith**
B. Arch./La. State
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† **ENS James B. Sullivan**
BSCE/U. of Ill.
to Port Hueneme, Calif.

**LT Charles R. Turbanic**
BSEE/Auburn
to Philadelphia, Pa.

† **ENS Gregory L. Utley**
BECE/Vanderbilt
to Port Hueneme, Calif.

**ENS Francis P. Weigand, Jr.**
BSCE/U. of Ill.
to San Diego, Calif.

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**NOSTALGIC TRIP** into the 19th century tells of the establishment of the Civil Engineer Corps as an integral part of the Navy — see page 4.

**NAVY RAILWAYS** are due for overhaul with locomotives scheduled for "remanufacturing." Details are found on page 13.

**THE U.S.S. *MARVIN SHIELDS*** visits the homeport of its hero namesake. See page 24.

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First official full uniform came to the CEC in 1881. A corps captain is portrayed wearing silver old english letters "CE" as a collar device. Sleeve stripes were separated by light blue velvet. The "CE" was replaced in 1905 by *silver* crossed oak leaves. The silver leaves changed to *gold* in 1922 and also became the sleeve device above the stripes of rank. The blue velvet was omitted in that year. (See inset, following pages)

# The long historical struggle to gain professional recognition

**By VINCENT A. TRANSANO, Ph.D.**
*Senior Historian, NAVFAC Historical Information Branch*

• Port Hueneme, Calif.

For more than a century, Navy civil engineers have celebrated March 2, 1867 as the birthdate of their corps. However, the truth of the Civil Engineer Corps' origin is somewhat more complicated than a simple establishment on a single date.

Whatever the significance of March 2, 1867, there is no doubt that prior to that date the Navy's civil engineers were not commissioned officers, and did not comprise a staff corps. They were simply civil servants employed at the Bureau of Yards and Docks and at the various Navy yards under its cognizance. Instead of "civil servant," the contemporary term "civil officer" was most often used to describe such civilian employees during this epoch. Nevertheless, this term is ambiguous to some degree. In the 1860s and 1870s, it was synomomous with our term "civil servant." However, during much of the nineteenth century, the Navy also used the term "civil officer" to mean a commissioned officer of a staff corps. This usage was perfectly consistent, since line officers during this period considered staff officers to be nothing more than non-combatant civilian specialists in uniform. This, despite the fact that staff officers held presidential commissions just as line officers did. The first Navy civil engineers were few in number; there were only seven on March 2, 1867. Premier among them was William P. S. Sanger, whom the Board of Navy Commissioners had originally hired as a staff civil engineer in 1836.

When Congress established the bureau system of management, on August 31, 1842, to replace the Navy Commissioners, it provided "That the Secretary of the Navy shall appoint . . . For the Bureau of Navy Yards and Docks one civil engineer, who shall receive for his services two thousand dollars per annum." The Secretary of the Navy then appointed Sanger to this position. The commandants of the individual Navy yards subsequently hired additional civil engineers locally — one for each yard. However, as the single civil engineer working directly for the Bureau in Washington, DC, Sanger was pre-eminent; and he increasingly coordinated the activities of the other civil engineers.

Until 1850 the Navy paid the civil engineers out of the funds provided for the works they were supervising.

However, in 1850 they were placed on the civil list along with Naval constructors. They were henceforth "civil officers" and the Navy paid them out of funds appropriated for the pay of the personnel of its civil establishment.

The first indication that the Navy was considering making its civil engineers into commissioned officers appeared in the Secretary of the Navy's report of December 5, 1855. In it, Secretary of the Navy James C. Dobbin said, "After much reflection and attentive observation of the practical workings of the present system, I am very favorably inclined to the plan suggested by a predecessor, of establishing a distinct corps in the Navy, whose duty shall be confined to hydrography, ordnance, civil engineering, and other scientific duties."

Despite Secretary Dobbin's "favorable inclination," there was no change in the status of civil engineers until 1867.

On March 2, 1867 — the date that would one day be celebrated as the birthdate of the Navy Civil Engineer Corps — the Thirty-Ninth Congress devoted exactly thirty-one words to civil engineers (and Naval storekeepers) in an appropriations act: "Provided that civil engineers and Naval storekeepers, when required at any of the Navy yards, shall be appointed by the President by and with the advice and consent of the Senate, . . ." These few words do not make it clear that the Civil Engineer Corps came into being on the date of the 1867 act. The act says nothing about civil engineers being commissioned nor does it mention the establishment of a new staff corps. The latter would, of course, follow from the former. The key phrase of the act is " . . . shall be appointed by the President . . . " Prior to March 2, 1867, civil engineers, like other civilian employees, were appointed by the Secretary of the Navy; henceforth the President would appoint them. As well as making civil appointments, the President also appointed men to commissioned officer status.

Did Congress intend to give Navy civil engineers commissioned status by making their position a presidential appointment? Unfortunately, Congress' intent is not clear — the act is simply too brief and ambiguous for this conclusion to be drawn. Can the status of Naval storekeepers, who are included in the act, provide a clue to Congress' intent? Unfortunately, no. Depending upon the situation, both civilian employees and commissioned officers could hold the appointment of Naval storekeeper.

Nevertheless, one pivotal fact can be extracted from the act of March 2, 1867. It was now at least *possible,* to consider civil engineers as commissioned officers. Prior to 1867, they could not have been commissioned officers under any circumstances because they did not hold presidential appointments. However, the act of March 2, 1867 was so ambiguous about the status of Navy civil engineers that an additional fourteen years was to pass before they would completely win recognition as commissioned officers constituting a new staff corps.

For almost two years after the passage of the act of March 2, 1867, there was nothing to indicate that the status of civil engineers had changed. The Navy Register of January 1, 1868, a publication which lists all Navy commissioned and warrant officers, did not list civil engineers. The Navy also continued to pay civil engineers from funds appropriated for its civil establishment.

The following year, however, brought a change. The Navy Register of January 1, 1869 listed five civil engineers in a section entitled "Naval Constructors and Civil Engineers" (Naval constructors had been commissioned officers since March 13, 1863 and consituted a staff corps). Nevertheless, the Register does not show civil engineers in its pay table, indicating that the Navy still did not pay them out of funds appropriated for military personnel. It is in the Register of 1869 that the term "commission" is first used in conjunction with Navy civil engineers. A "date of commission" of March 28, 1867 is given for the five civil engineers listed in the Register. Inexplicably, the Register does not list Sanger, although he was most certainly a Navy civil engineer at this time. Sanger first appears in the Register of January 1, 1873 and March 3, 1867 is given as his date of commission.

The "commission" referred to in the Register must be a military commission and not simply a civilian appointment, because only military officers are supposed to appear in the Register, and the same terminology is used in the section dealing with line officers — and here there can be no doubt that military commissions are implied.

Congress changed the pay status of civil engineers the following year. The third section of the act of July 15, 1870 (Section 1556 Revised Statutes), which fixed the pay of Navy officers on the active list, included civil engineers in its provisions. Henceforth, the Navy would pay civil engineers out of the military personnel appropriation. Both the Navy and Treasury Departments clearly recognized civil engineers to be Naval officers. Their pay was fixed on the longevity system like that of other officers and deductions were made for the benefit of the Navy Hospital Fund.

Under the Law of 1799 only "the officers, seamen, and marines of the Navy of the United States" were liable for this levy. The Register of January 1, 1871 reflected this change in status; there was now a listing for civil engineers in the Navy officers pay table. Thus, civil engineers were now appointed by the President, listed in the Navy Register, and paid as commissioned officers. The only thing that civil engineers lacked was rank.

Until March 3, 1899, staff corps officers did not possess military rank. Rank was a jealously guarded prerogative of line officers. Instead of actual military rank, the Navy granted staff corps officers "relative rank." Staff corps officers had professional titles (i.e., chief engineer, assistant surgeon, paymaster, etc.) and "ranked with" corresponding line officer grades (i.e., "Pay Direc-

tor ranking with Captain," but not having the actual rank of "captain"). Until 1871 no attempt was made to assign even relative rank to civil engineers. This state of affairs changed on March 3, 1871, when Congress passed an act which stated that "civil engineers shall have such relative rank as the President may fix." Despite this new authority, another ten years would pass before an American president would "fix" relative rank for Navy civil engineers.

Congress in an act of February 27, 1877 further clarified the status of civil engineers. In Sections 1473 through 1479 of the Revised Statutes, Congress discusses the relative rank assigned to officers of the Medical Corps, Pay Corps, Engineer Corps, Naval Constructors, Civil Engineers, and Chaplains. (Section 1478 dealing with civil engineers merely repeats the words of the act of January 1, 1871.) Next follows an amendation to Section 1480 which states: "The grades established in the six preceding sections for the staff corps of the Navy shall be filled by appointment from the highest members in each staff corps." Since one of these "six preceding sections" is devoted to civil engineers, Congress clearly indicates that it considers civil engineers to be commissioned officers comprising a staff corps.

The following year, however, the position of Navy civil engineers was completely reversed as a result of a dispute over the dismissal of one of their number. Attorney General Charles Devens in an opinion of November 18, 1878 ruled, "The appointment [of civil engineers] is local in its character. And although under the act of March 3, 1871, the President was given a discretionary power to confer relative rank upon civil engineers, this power has never been exercised, and they have no rank by which their relation to the officers or men in the Navy can be determined: Held, accordingly; (1) that civil engineers (in the absence of any action by the President conferring upon them relative rank) are not to be considered Naval officers, but civil officers . . ."

This ruling, drastic as it might seem, did not appear to affect the status of civil engineers in the Navy. Civil engineers appeared in the Navy Registers of July 1, 1878, January 1, 1879, and January 1, 1880 without any indication that their status as Navy officers was altered.

In 1881, the whole question of the status of Navy civil engineers was finally, once and for all, resolved. The first significant event took place on February 24, 1881 when the President "conferred relative rank on civil engineers of the Navy, and fixed the same as follows: one with the relative rank of captain; two with the relative rank of commander; three with the relative rank of lieutenant commander; and four with the relative rank of lieutenant."

Shortly thereafter, Navy civil engineers, armed with their new relative rank, sought a final resolution of their legal status from the Justice Department. They no doubt wanted a reversal of the 1878 Justice Department opinion that they were not Naval officers. The civil engineers petitioned Attorney General Wayne I. MacVeagh to respond to the following question: "Are civil engineers of

the Navy officers in the Navy or civil officers connected with the Navy?"

On April 12, 1881, Attorney General MacVeagh, taking into account the relevant acts and amended statutes, reversed the decision of his predecessor and further stated, " . . . I am led to the conclusion that the civil engineers in the Naval service must be regarded as a staff corps of the Navy — that they are 'officers in the Navy' possessing . . . defined relative rank as such with other officers in the Navy, and are not merely 'civil officers' connected with the Navy."

The petitioning civil engineers further asked whether they were entitled to full retirement rights as Naval officers. Once again, the Attorney General answered in the affirmative. Taking advantage of this second decision, William P. S. Sanger retired from the Navy on October 15, 1881 with the relative rank of captain. He had completed more than forty-five years of service to the Navy as both civilian employee and Naval officer.

Whatever the initial status of civil engineers, the Navy did not grant them a uniform until 1881. Six months after the President fixed the relative rank of civil engineers, a uniform circular of August 24, 1881 specified that civil engineers were to wear a regulation staff officer's uniform with the rank stripes placed on a background of light blue velvet cloth. In addition, the letters "C. E." were to be embroidered in silver old-english script on the shoulder straps and epaulets.

Thus, after fourteen years, Navy civil engineers finally managed to win full recognition as commissioned officers, comprising their own staff corps, and possessing a distinctive uniform. Nevertheless, the struggle to achieve complete equality with officers of the other staff corps and with line officers was by no means over.

Another seventeen years would pass before a civil engineer became Chief of the Bureau of Yards and Docks. This, despite the fact that the senior officers of the other staff corps were already chiefs of their respective bureaus. In fact, the Revised Statutes specified that staff officers with the relative rank of captain could be appointed chiefs of bureaus. From February 24, 1881 when they received relative rank, civil engineers were eligible for such appointments; nevertheless, the Chief of the Bureau of Yards and Docks remained a line officer until 1898. On April 4, 1898, Captain Mordecai T. Endicott became the first civil engineer to be appointed Chief of the Bureau of Yards and Docks. He was also the first civil engineer to reach the rank of rear admiral (the rank held by bureau chiefs at this time).

It was to take even longer for Civil Engineer Corps officers to win the right to command. The Secretary of the Navy granted them authority to command Naval Construction Battalions on March 19, 1942. However, they could only bear the title "Officer in Charge" and not that of "Commanding Officer." It was on April 23, 1951, that Civil Engineer Corps officers became "Commanding Officers" in name as well as in fact.

Why did the first Civil Engineer

# . . . gaining professional recognition . . .

*(continued from preceding page)*

Corps officers have to suffer through so many vicissitudes in order to win recognition for their new status? Part of the problem undoubtedly resulted from the line officers' view of staff officers during the Nineteenth Century. As Charles O. Paullin in his *History of Naval Administration* said, "The line naturally resisted the assignment of rank to the staff. An institution that has developed traditions and a corporate life, and that enjoys a monopoly of rights and privileges, is wont to resist strenuously its being cheapened or made common either by undue additions to its membership or by extension of its privileges to others."

Line officers, who controlled the Navy, jealously guarded their prerogatives during the nineteenth century. From the earliest days of the Navy, line officers fought to keep commissioned status, rank, and such attributes as uniforms and grade insignia only for themselves. They could, as a matter of course, be expected to resist the establishment of a new staff corps and the assignment of relative rank to it.

Nevertheless, the Navy and the line seem to have accepted civil engineers as commissioned officers fairly early on — witness their appearance in the Navy Register as early as 1869. What probably contributed most to the difficulties experienced by Navy civil engineers in winning recognition as commissioned officers was simply their small number and their widely scattered geographical distribution.

Of the seven Navy civil engineers in 1867, only one was at the Bureau's headquarters in Washington, DC; the other six were located, one each, at the various Navy yards. Such a small, widely dispersed group did not command much interest nor did it have much influence in the Navy Department or on Congress. Given these very real disadvantages, it is a tribute to the ability and professionalism of these first Navy civil engineers that it did not take them much longer to win recognition for themselves as regular commissioned officers of the Navy. □

# *On Advice Of Counsel*

*Corrupt influence is the perennial spring of all prodigality, and takes away vigor from our arms and wisdom from our councils.* Burke

All things come to an end, and connections with the government for a federal employee must come to an end abruptly and finally. The government employee, whether civilian or military, leaving federal employment, whether by resignation or retirement, is subject to legal disqualifications.

These disqualifications concern not only the former employees, who may lose pensions or even be prosecuted criminally, but also current employees, who may not deal with disqualified former employees and must report violations. (32 C.F.R. 40.7(i) and 721.6(d).) The disqualifications overlap but are fairly simple.

All former officers or employees, military or civilian, remain subject to the following disqualifications:

They may not at any time represent anyone other than the United States in connection with a matter in which the United States is a party and in which they participated personally and substantially on behalf of the Government. (18 U.S.C. 207(a).)

For two years they may not represent anyone other than the United States in connection with any matter within the boundaries of their official responsibility in the last year of their Government service. [18 U.S.C. 207(b)] Those of high rank (GS-17 and military 09) may not for one year represent anyone to the department or agency in which they served. [18 U.S.C. 207(c)]

Retired regular officers are subject to further restrictions, partly overlapping and partly extending these. They may not at any time assist in prosecuting a claim against the United States if they worked on that claim. [18 U.S.C. 283.] They may not for two years assist in prosecuting a claim involving the department in which they hold retired status. [18 U.S.C. 283.] They may not, under penalty of losing pensions, for three years sell supplies or war materials to any uniformed service (Army, Navy, Air Force, Marines, Environmental Science Service, Public Health Service). [37 U.S.C. 801(c).] They may not at any time sell anything to the department in which they hold retired status. [18 U.S.C. 281.]

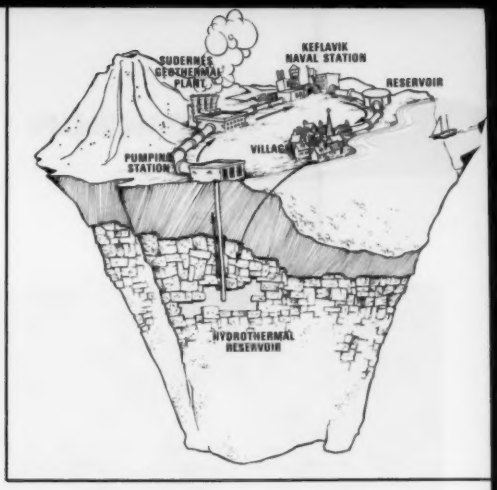
The scope of these disqualifications depends upon the scope of the terms "selling" or "representing." "Selling" has been formally defined as signing a bid, proposal, or contract; negotiating a contract; contracting for these purposes, discussing changes in specifications or price, or settling disputes; and any liaison activity with a view toward sale. [DOD 5500.7 of 15 Jan 1977.]

"Representing" probably means any act on behalf of another (not the former employee himself) in a proceeding, conference, or other contact.

There is no prohibition upon a former officer or employee working for any firm that deals with the Government; but any contacts of the former officer or employee with the Government may come within these disqualifications. □

# Navy gets into Icelandic hot water

By RONALD E. NIEMI
*P.E., Wis.*




•Keflavik, Iceland

Geothermal energy is the natural heat energy below the earth's surface. It normally occurs at great depths but in some places can be found close to, or even at, the surface. Some of the locations where surface geothermal energy occurs are Hawaii, the western part of the United States, New Zealand, Italy, Japan, the Soviet Union and Iceland. This energy has been recognized for centuries. Only in the past few decades has it been harnessed for the common good. In many places around the world, developers have drilled and extracted hot water or steam, and used it to heat or cool buildings; process food and other consumer goods; heat cattle barns, greenhouses, and fish ponds; and to generate electric power.

A Memorandum of Understanding of 1974 between the United States and Iceland commits the U.S. to join with Icelandic entities in using geothermal sources underlying the Keflavik Peninsula to provide heat for the Naval Station at Keflavik. This will be accomplished by a proposed system that will consist of a production plant and primary distribution piping; and modification of the heating systems within the buildings.

The Naval Facilities Engineering Command, through its Atlantic Division, is in the process of having the building heating system modifications designed and constructed to replace the existing yet deteriorated oil and electric heating systems at the Naval Station. The actual design is being accomplished by contract.

The Sudernes Regional Heating Corporation, which is an organization owned jointly by private citizens and the Icelandic Government, will install, own, operate and maintain the production plant and primary water distribution system. The group will charge the Navy a connection fee and sell geothermal energy for base use. The annual payments for service will be negotiated in advance and will be based on operating and maintenance costs and a resource allowance. The corporation has already developed wells and transmission pipelines to the Keflavik area and has begun distribution to some communities near the Naval Station.

The system that will furnish energy to the Naval Station is located at Reykjanes (25 miles west of the capital city of Reykjavik) and is a recent development. The present capacity of existing wells and power plant at Reykjanes is 25 MW. Capacity will be increased to 110 MW and will be split between the Navy and surrounding Icelandic communities. Wells at the foot of a dormant volcano are to provide steam and hot brine to the Sudernes plant. Warm, pure water from another well will also be piped to the plant. Heat from the steam and hot brine will be transferred to the pure water to raise its temperature to over 200° Farenheit. The heated water will then be piped to the Naval Station where it will arrive at the buildings at no less than 194° Farenheit. Water used for space heating will exit the buildings at 122° Farenheit and go to a pressure reservoir and pump station where more hot water from the Sudernes plant will raise the temperature up to 140° Farenheit.

From the reservoir, the water will be piped to surrounding villages for use in space heating. After leaving the villages the water will be returned under ground where it will percolate down through porous volcanic soils and eventually return to its original earth strata.

The project will be funded by MCON appropriations and be spread over three fiscal years. The total estimated project cost is 42.2 million dollars. The first phase was funded in FY80 and consists of a connection charge which is paid to the Sudernes Regional Heating Authority. The connection charge will be used to enlarge well facilities, provide additional transmission lines to and around the base and connect the individual buildings on the base to the geothermal system.

The second phase, funded in FY81, provides for the conversion of the heating systems in the buildings to geothermal heating. This consists of disconnecting, and removing the existing oil fired boilers, oil fired warm air furnaces, electric space heating units and related domestic water heaters and providing new equipment that is suitable for use with geothermal water. The third phase which is planned to be funded in FY82 consists of providing emergency back-up boiler capability in 77 of the 313 Naval Station buildings.

Completion of the project will eliminate Navy reliance on oil for heating purposes, eliminate fossil-fuel emission, storage and handling problems, reduce the electrical load and consequently save dollars. Economic analysis indicates a payback of less than 10 years by eliminating use of 7.1 million gallons per year of heating oil and 2.5 million kilowatt hours of electricity every year. □

# Commander's Award

## For Editorial Excellence

ennis Perham, retired employee of the Chesapeake Division of the Naval Facilities Engineering Command, has received the Commander's Award for Editorial Excellence for his contribution to *The Navy Civil Engineer* which appeared in the Summer/Fall 1979 edition, titled "Take A Closer Look At Our Natural Resources." The bronze award was presented Perham at his residence in Schenectady, N.Y., by Capt. Robert J. McHugh, Jr., CEC, USN, commanding officer of the Northern Division, on behalf of the Commander, Naval Facilities Engineering Command, Rear Admiral W. M. Zobel, CEC, USN.

## Honorable Mention

★ **CAPT PALMER W. ROBERTS, CEC, USN (Ret)**
for
*"D-Day, Europe, 1944"*
Appearing in Summer/Fall 1979 edition

★ **CDR DANNY E. GLENN, CEC, USN**
for
*"My POW Career"*
Appearing in the Summer 1980 edition

★ **CDR JOHN G. LEECH, CEC, USN**
**RICHARD A. GARDNER**
**WILLIAM J. POWERS**
for
*"Hazardous wastes — disposal problems of the '80s"*
Appearing in the Winter/Spring 1980 edition

Nominations for the awards were made by an awards committee comprising of Capt. Fred G. Kelley, commanding officer of the Naval School, Civil Engineer Corps; Harold Welsh, editor; and Judith Johnson, public affairs officer, NAVFAC HQ.

*Speech privacy and freedom from distraction is achieved in the open office plan with*

# Acoustical Design

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• Pearl Harbor, Hawaii

Within recent years, there has been increasing emphasis to incorporate flexibility within office layouts. Use of the open plan office rather than the more traditional partitioned types has gained momentum. Potential for increased work flow and efficiency, as well as functional and beautiful work station furniture, has enhanced the acceptability of open office plans. However, experimental evidence, observations, and field test data all support the basic conclusion that only under ideal acoustical conditions can the open office plan be judged fully acceptable for the persons who occupy it.

**Two objectives sought**

The two main acoustical objectives in open office plan design are speech privacy and freedom from distraction.

Speech privacy is the degree to which sounds or conversations emanating from outside a work station are rendered unintelligible or unobjectionable to persons within the same area. It is one measure of workability of the open plan office. It there is total lack of speech privacy, the space generally will not be acceptable, especially to those who must conduct business, either in conference or on the telephone.

But complete privacy is often difficult to obtain, even between enclosed offices with full height partitions. It is unreasonable to expect full privacy in the open plan. Nevertheless, there exists a level of privacy between the extremes which is satisfactory for most space usage, and is obtainable with the appropriate design.

There are well established techniques for calculating speech privacy as a function of parameters which can accurately be accounted for. These parameters include voice level, acoustical characteristics of the sound transmission path, and level and character of any masking noise.

Distraction and annoyance, when not controlled, are undeniable major criticisms of the open plan environment and are difficult to quantify in comparison to speech privacy. However, it is known that annoyance is directly related to the sound level of the distracting sound, as well as the contrast of that sound level to the general background noise level.

A rather loud sound may be more acceptable if it is apparent all the time but rarely rises in sound level above the general background noise. An example would be a noisy mechanical calculator in a room filled with operating typewriters. A person working in such a space may be less

annoyed with the total acoustical environment than working in a very quiet room where the only intrusive sound is the same calculator. To reduce the contrast between an offending noise and the general ambient room noise, a background sound system is often used.

## Consider several factors for good open plan acoustics

There are several individual factors and basic design areas to consider for good open plan acoustics. They include background noise levels, the importance of acoustical surfaces, the use of barriers and concepts in general space use. It must be realized that many of the factors are equally important, and that proper design will necessitate a consideration of all of them in the open plan design.

In the open office plan, background sound (also known as masking sound) can be introduced at greater levels than the general ambient room noise and still be acceptable.

The ocean beach has an ideal background sound — sounds that are constant but not cyclicly repetitive, common but not distracting, full of variety but not compelling to attention, of limited character but not containing information. By contrast, it is surprising how unacceptable even the best programmed music has proved to be in many office environments.

The loudspeaker for background sound system must supply continuous masking sound which is high enough in level, and with proper spectral content, to provide a degree of speech masking (speech privacy) and reduce contrast of distracting sounds (annoyance).

The volume of a masking sound system is designed to give optimal masking without itself being a source of annoyance. Specifications and details for such a system must guarantee a constant level and spectral output relatively independent of a listener's position within the space. (Local work-station or desk mounted units are usually unsatisfactory.)

To achieve proper distribution of masking sound, the system's loudspeakers in the ceiling plenum are placed evenly distributed and facing upwards to reflect the masking sound off the underside of the structural slab above. Economics of the system weigh heavily on the placement and location of the loudspeakers since the core of the system (the sound generator, filters that equalize the noise spectrum, and the power amplifiers) are off-the-shelf items requiring very little labor for installation.

The choice of ceiling material affects the power requirements for the masking noise system amplifiers. The one way transmission loss for the ceiling material must be known in order to determine the power to be supplied to each loudspeaker during the design phase of the project.

The information is now available from the various manufacturers of ceiling boards suitable for open plan work. Emergency paging should not utilize the same loudspeakers because of greatly increased power requirements, since the sound must pass through the ceiling material.

The use of masking sound in the open air plan office is one of the most key factors in achieving satsifactory acoustical results.

Flanking is sound reflecting either around a barrier via a vertical surface, under a barrier via the floor surface, or over a barrier via the ceiling. The idea is that a barrier, in the absence of surrounding reflecting surfaces, is in fact effective in acoustically shielding adjacent areas.

The only sound transmited in this case is that which diffracts over or around the barrier. When a surface is brought into the vicinity of the barrier, it reflects sound around the barrier, and the sound transmitted becomes the sum of the diffracted and the reflected sound. If the surface is totally reflective, it will negate the barrier isolation, and if totally absorptive, it will act acoustically as if it were non-existent.

It is important to design potentially reflective surfaces to be highly absorbent, thereby enhancing barrier efficiency.

The efficiency of a material to absorb sound at a specific frequency is rated by the sound absorption coefficient, i.e. the fraction of energy of incident sound absorbed, not reflected by the surface. It is denoted by the Greek letter $\alpha$ (alpha) and can vary from $\alpha = 0$ (perflectly reflecting) to $\alpha = 1$ (perfectly absorbing). The largest the $\alpha$ value, the more absorbent the surface is (at that frequency).

In the open plan, the ceiling plane and certain vertical surfaces must be highly absorptive, i.e. $\alpha$ must exceed 0.95 in the frequency range from 1000 to 4000 Hz (the range contributing most to speech intelligibility).

## An acoustically absorptive ceiling is desired

This acoustical treatment is for more than control of reverberation in the office; rather, it is to prevent the propagation of sound long distances

resulting in better work flow and efficiency . . .

and the "flanking" of sound around corners and barriers.

The ceiling is an extremely critical surface if barriers are to be used for shielding. The challenge is to provide an acoustically absorptive ceiling which also provides lighting and air supply and return.

The use of mineral fiber tile severely limits the degree to which the ceiling can be absorptive. The highly absorptive ceiling tile should be a glass fiber type. There are several surface styles to choose from. These ceiling boards are one inch thick and are suspended in an exposed T-bar suspension system.

Care should be taken in selecting the ceiling materials at the perimeter of the open plan space when it is bordered by full height partitioned spaces. Light, porous glass fiber ceiling panels, although excellent sound absorbers, are relatively poor sound barriers and will permit noise from the open plan area to travel over the full height partition to the adjacent enclosed space, and vice versa.

When a ceiling surface with high sound absorption is provided, it is essential to minimize extraneous sound reflections from lighting fixtures in the ceiling space. If a luminaire must be placed in the ceiling, sound reflecting surfaces of the fixture should have as high a sound absorbing characteristic as possible, or be capable of diffusing the sound, rather than reflecting it.

If possible, the lighting fixtures should be eliminated from the ceiling space completely by incorporating them as an integral part of the office furniture. A good concept provides specific task lighting, as well as upward directed indirect lighting.

Lighting fixtures in the ceiling space should not be located directly over or near a partial height barrier. Flat, hard, acrylic lenses are extremely undesirable, since they reflect sound. The use of an open "egg carton" exposed surface with fiberglass absorption in the pan behind the lamps is desirable when the light fixtures must be an element of the ceiling plan.

Lighting fixtures should be as small as possible when a conventional ceiling/lighting system is used. Coffered ceiling systems offer some advantage to flat systems if the ceiling board or lighting system is not acoustically optimal. However, the cost is increased.

Exposed, large, uninsulated HVAC ducts would also reduce the effectiveness of the ceiling surface. Exposed air supply ducts having widths greater than 12 inches should either be wrapped with exposed one-inch thermal insulation, or be circular. The circular configuration will diffuse the sound rather than provide specific sound reflections.

## Some general conclusions to consider

There is a tendency in the open plan to utilize sound absorption on too many vertical surfaces where it is not required, and to neglect it where it is required. The rationale behind the proper choice is somewhat complex. However, the following general conclusions may be reached:

- Sound absorbing materials must be utilized on surfaces that would reflect sound around, under, or over barriers, which reduce sound isolation and speech privacy. The material can further be used to an advantage on vertical surfaces surrounding typewriters, mechanical calculators, reproduction equipment, and the like.
- The vertical surface adjacent to a telephone in a work station should be used for sound absorption if the individual using the phone is sitting very close to that surface and talking directly towards it.
- Sound absorption on vertical surfaces used indiscriminately in open conference areas or large offices may have a negative impact, that is, people utilizing the space may believe that they are not speaking loudly enough since there is an absence of sound reflection back to them from surrounding surfaces. As a result, they may increase their speech effort in order to achieve the same feedback to their ears. As a result, their speech level will be much higher than without the sound absorbing surfaces. This is a subtle factor and requires special attention.

Since barriers are generally used in groups, their surfaces become potential reflectors of sound around each other. The exterior surfaces of barriers, which are generally part of a work station unit, must therefore be highly absorptive. This can be achieved by either designing the absorption into the structure of the barrier, or by applying panels to the vertical surfaces of the work station.

Both approaches can be done quite effectively. Unless care is taken in acoustically treating these surfaces, the benefits of other properly designed elements in the open plan can be totally negated.

Where the existence of a reflective vertical wall surface (such as at the building core) will limit the effectiveness of barriers, a section of absorptive treatment is necessary. Dense fiberglass is highly recommended and the treatment must be floor to ceiling. The treatment can be made a permanent part of the wall surface, or can be added in the form of hang-on decorative panels.

Window surfaces are another example of a vertical surface that may provide flanking around a barrier. Drapery and vertical blinds are only partially effective in reducing this sound flanking path.

Draperies and vertical blinds, to be effective in preventing flanking from themselves or the windows behind them, must provide $\alpha$ in excess of 0.90. However, even if efficient sound absorbing draperies or vertical blinds are provided, people tend to open them in order to be able to see out the window, thereby negating their effectiveness. Therefore, when work station/barriers combinations are placed perpendicular to window areas, any gap between the barrier and the window (or column or mullion) must be closed to prevent flanking.

The floor of an open plan must be carpeted, mainly to reduce offending impact noise such as footsteps. However, there are basically no other specific requirements for carpeting since barriers should extend down to the floor to prevent sound from flanking under them. The use of carpeting alone to achieve acoustical privacy is unsatisfactory.

The use of partial-height barriers in the open plan is one of the most significant factors in achieving adequate speech privacy and freedom of annoyance from adjacent work stations. Neither of these objectives can be achieved without their use.

The effectiveness of a barrier being placed directly between a talker and a listener depends upon the following factors:

- distance between the talker and the barrier;
- distance between the listener and the barrier;
- effective barrier height;
- barrier width'
- frequency of sound.
- Barrier performance is further affected as:
- thc distance between the talker and the barrier decreases, the barrier is more effective in providing for speech privacy;
- the distance between the listener and the barrier decreases, the barrier is more effective;
- the barrier effective height increases, the barrier becomes more effective;
- the barrier width decreases, the effectiveness may decrease, as sound will diffract around the end of the barrier;
- barriers are more effective in reducing the higher frequencies than the lower frequencies. Reducing the higher frequencies reduces speech intelligibility, even though a low "mumbling" type of sound may still be heard since speech intelligibility depends mostly upon the 1000 - 4000 Hz frequencies (effective barrier height is vertical distance between the height of the noise source and the height of the top of the barrier).

Generally, work stations are designed for the open plan which incorporates a desk, storage, and shelves, thereby providing a barrier at the same time. Aside from the requirement that the barrier have an absorptive exterior surface as previously discussed, it is obvious that barrier height relates directly to the degree of resultant isolation.

There is no special barrier height above which isolation is acceptable, and below which it is unacceptable. The barrier should be as high as possible with limits established by design and code considerations. As a guideline, a minimum height of 6 ft. 6 in. is generally specified.

Glass, or other transparent materials, may be integrated into the work station/barrier design where visual continuity is required, but where direct transmission of sound is undesirable.

Barriers by themselves, however, are not sufficient to provide these objectives unless they are used with an effective masking noise system and the flanking paths over and around the barriers controlled through the use of sound absorption on adjacent surfaces. For this reason, many users are dissatisfied and disappointed when they provide barriers in open plan areas when the other acoustical factors have not been controlled.

Approaches to general space organization and planning must be considered during the early stages of interior planning. This includes consideration of work station design and orientation of such work stations with respect to themselves, as well as other work areas.

Quiet areas where concentration or speech privacy is required should be placed as far away from noisy areas as possible.

Conference rooms and offices should be provided with full height partitions where confidential privacy and freedom from distraction are essential.

Noisy machines such as typewriters, keypunch, and reproduction equipment should be enclosed in properly designed, fully partitioned, spaces. Large typing pools in the open plan are undesirable. If such a pool is required, it should be in its own partitioned space.

Line-of-sight communication should be avoided between noise sources (voice, typewriter, etc.) and work stations.

In summary, careful attention must be given to all elements that interact to influence that acoustical characteristics of an open office plan. Failure to consider one aspect of the acoustical design may negate the careful planning and beneficial functions of other design considerations.

Thorough analysis and acoustical design of the open office plan is a must if the office is to be totally successful. In many cases, the professional services of an acoustical consultant may be needed.

# Putting the motive back into locomotives

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• Alexandria, Va.

In the days when steam locomotives ruled the rails, it was often said that a breakdown took ten minutes to locate the cause, ten days to repair and cost $10,000 to fix. These simple, naked giants displayed their means of locomotion to all and were surprisingly reliable, but the cause of a failure was often massive and immediately evident. Repairs frequently required shop fabrication due to nonstandardization and the craftsman method of manufacture.

In the present sophisticated Diesel-electric locomotive age, the saying now goes that the cause of the breakdown takes ten days to find and ten minutes to replace a ten-cent part.

It is those "ten-cent" type parts (i.e., 10¢ x inflation) which make our 25-year and older locomotives most difficult to maintain and to keep operating with any degree of reliability. Not only have these parts become very expensive, they are also very scarce; in many cases, the original manufacturer no longer exists or cannot provide replacement parts.

New locomotives range in price from $350K to $550K and no OP,N funds have been authorized for procurement since the early 1950s (Korean period). The procurement outlook for the future appears equally grim; therefore, some other means had to be found to upgrade the vintage locomotive fleet.

The "remanufacturing" process was explored and it was determined that it is indeed a viable alternative — in fact, it has become the Navy's preferred alternative since "remanufacturing" can be accomplished with O&M,N dollars at about half the cost of a new locomotive. Many commercial railroads also suffering from scarcity of capital have adopted this approach. In fact, the railroads refer to their remanufacturing process as Capital Rebuild Programs.

A related factor is that nearly all the current production is built in sizes not suitable for industrial switching, therefore, remanufacturing of existing locomotives also fills this need.

A capsule definition of "remanufacturing" in the context used here is that it results in a "like new locomotive modernized to state of the art specifications with a new equipment warranty." To more clearly describe the process, a comparison of "remanufacturing" and the terms more familiar to Navy Transportation Maintenance organizations (overhaul/rebuild) are defined as follows:

*Overhaul* The process of taking an

unserviceable locomotive and, with the installation of a minimum of new and rebuilt parts and/or repair of existing parts, bringing it back to serviceable condition.

*Rebuild* Expansion of the overhaul process sufficiently to enable the locomotive to meet all of the original specifications of the manufacturer.

*Remanufacture* Retrofitting and upgrading the locomotive with the newest type of available components to such an extent that it meets the characteristics of present production locomotives.

A Navy-wide survey in 1980 conducted by this command's Chesapeake Division Transportation Equipment Management Center was instrumental in determining the minimum size and quantity of locomotives required to maintain mission capability if the equipment were remanufactured to state-of-the-art specifications using currently manufactured components. This study addressed both day-to-day requirements as well as mobilization. It further pointed out those areas where a locomotive's original power plant could be replaced with a smaller, more fuel efficient engine.

As an example of what happens here, a 1000 HP (986 cv) engine is replaced with a "truck type" engine of 450-500 HP (444-493 cv). The smaller engines are obviously more fuel efficient and much easier and less costly to maintain. The weight/adhesion difference is compensated for by adding ballast to the desired gross tonnage; therefore, the only real loss is in the ability to travel at mainline speeds (50-60 mph) which is not needed at Navy activities.

The Navy requires 102 locomotives to meet current and mobilization requirements and, if the 10-year remanufacturing program developed by NAVFAC can be funded and accomplished, the latest potential savings to the Navy are in the range of $10 million while providing a modern, efficient locomotive fleet.

The usual procedure for remanufacturing a typical locomotive entails stripping it down to the bare frame, sandblasting to reveal any repairable structural defects and to prepare for refinishing, replacing all wiring, updating the air brake system, installing new, solid state electrical control system cabinets, and mounting a modern, factory rebuilt Diesel engine and main generator. The trucks and traction motors are repaired to original specifications as necessary and the entire locomotive is refinished in Navy colors and markings. Eighty units have been selected for this process to be accomplished in 1980-90.

A secondary objective of the CHESDIV study was to identify those locomotives which are required for mobilization. These units are to be kept in operational condition and regularly exercised by the activity having custody and maintenance responsibility and would be available for use where needed to satisfy mobilization requirements. No preset level of utilization would be required for these locomotives.

A final objective is to declare as excess the remaining units not candidates for remanufacturing or mobilization.

A side issue studied during the survey was the emerging requirements at a selected number of activities to spot coal cars at power plants converting to solid fuel use. Replacement (or possibly remanufacture) of two car spotters and acquisition of three more were recommended prior to coal conversion of the affected activities.

At the present time five 120-ton locomotives are either completed or are undergoing remanufacture using a limited amount of NAVFAC O&M,N or owner activity generated Navy Industrial Funds (NIF). The need now is to identify adequate funds to permit remanufacture of a group of eight locomotives per year to 1990. This is essential to the success of the planned program and will insure an adequate fleet of locomotives for present mission requirements, for mobilization and for conservation of scarce and expensive petroleum fuels. □


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# Exigent Minor Military construction

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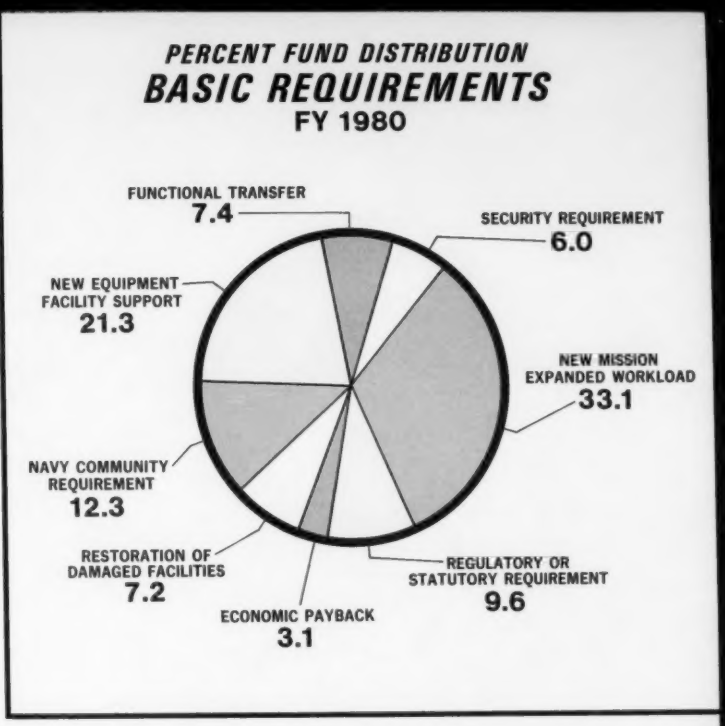



• Alexandria, Va.

The name of the game is *exigent*. If it meets the programming criteria, then it's both urgent and exacting. Urgent in the sense that the construction is urgently required and exacting in the sense of application of the criteria discussed in the Facilities Projects Manual. In particular, the application of the incrementation rules centered around the Congressional term of "specific purpose" are applied with exactness.

The name of the game is also *minor,* currently meaning less than $500,000. This limit was set by Congress in 1977, effective in Fiscal Year 1979, and the effects of inflation have eroded its buying power. Efforts are underway to raise that limit, but when it will be raised is problematical.

Finally, the name of the game is *MILCON,* meaning military construction. The definitions of construction, repair, equipment installation, etc., as defined in the Facilities Project Manual are exigently applied to insure that *all* of the construction is included in the project and that *only* construction is included in the project. This avoids incrementation and ensures that the available EMM (exigent minor military construction) funds are stretched to cover as much construction as practical.

Now that the name of the game is defined, let's take a look at where the Navy's FY 1980 EMM money was spent. As the pie chart indicates, the largest portion (33%) of the EMM program provided facilities to meet new missions or expanded workload. Examples range from facilities support for the Service Life Extension Program for aircraft carriers at the Naval Shipyard, Philadelphia, through facilities to introduce the EA-6B aircraft at the Marine Corps Air Station, Iwakuni, Japan, to an overwater test range facility for submarine periscope antennas at the Naval Underwater Systems Center, New London, Conn.

Too frequently we boast about our ability to provide required facilities through good planning and normal funding. We find that we have critical and expensive equipment (such as training equipment or a computer) being delivered but no place to put it. Over 20% of our EMM funds met this facility need in FY 1980. Most of the 12% of EMM funds expended for navy community requirements were used outside of United States.

It seems that new regulations or statutory requirements are being written almost daily. Frequently this results in a critical requirement for a facility. Examples of these FY 1980 EMM projects include pollution abatement projects, safety projects, and fuel storage projects.

The message, hopefully not too well hidden, is that the EMM 'game' is alive and well and that a lot of worldwide 'players' are getting a wide variety of facilities. It is an exceptional program in that it can usually provide a facility as soon as it can be designed and constructed — if it meets the criteria in Chapter 2 and 3 of the Facilities Projects Manual.

If you have an urgent construction project of less than $500,000, review those portions of the manual and if the project seems to meet the requirements, it is recommended that you contact the Emergency Construction Office NAVFAC HQ (Autovon 221-8601) for pointers. An advance copy of the project will also allow that office to expedite the design authorization and provide the facility sooner. □

# Delivery to occup for Adal

Bayshore Housing, Adak, Alaska

• Adak, Alaska

How to define modular construction? To some it implies joining premanufactured assemblies into completed structures. The portable modules are generally designed to fully utilize assembly line techniques and to reduce on-site work, providing a structure at low cost. The recently constructed Bayshore family housing complex on Adak Island may have redefined the concept.

The naval station at Adak pays extremely high prices for its facilities. Its isolation (1100 air miles southwest of Anchorage, Alaska), its poor weather, and the difficulty of transporting materials to the island result in construction costs averaging more than three times that of the lower 48 states.

When personnel at the Western Division, Naval Facilities Engineering Command (WESTDIV), solicited proposals for the turnkey design and construction of 100 family housing units, they received an innovative modular plan in which the module was to be an entire house.

Aleutian Constructors, Joint Venture, and R. James Dersham, Architect, both of Seattle, developed a construction system which produced one complete four-bedroom dwelling unit, or two two-bedroom units, in the form of a portable two-story box supported by a reinforced concrete perimeter foundation. The perimeter wall provided structural strength and attachment points.

The entire unit could be lifted by a large-capacity crane and transported on specially fitted, double-width flatbed trucks.

Increasing the module size to a whole-house unit eliminated most of the on-site assembly and finish work, reducing expensive Aleutian labor and equipment costs. The contractors' proposal was to combine the unitized homes into multifamily buildings. Modules would be joined by prefabricated entryways and garages into two- and five-family dwellings.

Construction of the modules began at the Port of Tacoma, Wash. Preparation of the Adak site began simultaneously, including road beds, underground utilities, and the concrete-post footings upon which the perimeter foundations would rest.

By the close of Adak's construction season the site preparation was complete. An advantage of the mod-

# of ready
# y housing
# naval station

By LCDR DONALD B. HUTCHINS, CEC, USN
*Assistant Resident Officer in Charge of Construction, Naval Station*

(Top) Two units depart Tacoma, Wash. for placement (middle and bottom) in new Adak housing area.

ular system was that work could continue throughout the winter months at the Tacoma site, whereas outdoor construction is virtually impossible at that time in the Aleutian Islands.

WESTDIV's Resident Officer in Charge of Construction (ROICC), Adak, assigned a full-time construction representative to the Tacoma production site to verify compliance with plans and specifications and to coordinate the many contract details.

In March 1980, a 200-ton crane was brought to the production yard and the most crucial test of the concept was successfully passed; a 66-ton, two-story building was hoisted four feet into the air, swung through a 90-degree arc, then softly placed back on the ground. After thorough inspection showed that the test had caused no damage, the project literally started to move.

In two days the 75 completed structures (50 four-bedroom and 25 double two-bedroom units) were moved one mile to Tacoma Harbor and loaded aboard a standard barge and two 450-foot "super barges."

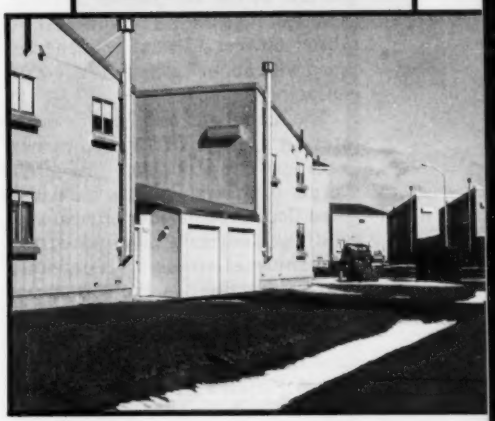
With them went two 200-ton cranes, four specially configured flatbeds, and all the prefab panels and materials required to finish the garages and entryways, plus equipment for four children's playgrounds.

Two ocean-going tugs towed the barges northward up the inside passage of Canada's west coast and across the stormy Gulf of Alaska. The tugs arrived at Adak in April 1980, and within five days the houses were in place on their prepared footings.

Construction of roads, driveways, entries, garages, street lights, playgrounds and final details occupied the remainder of the second construction season.

By the time Adak's winter williwaws once again threatened island inhabitants the units were complete. Many families were able to move in and enjoy the Christmas season in comfortable new quarters.

While the units are expensive by lower U.S.A. standards, (at $95,000 each), this new concept achieved a significant saving over the normal cost of construction in an isolated area. The turnkey process provided a major step toward achieving the best possible product at the lowest practical cost. □



Repairs:

# Refractory Relining

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• Pearl Harbor, Hawaii

Fleet Training Group, Pearl Harbor, acquired a direct-fired afterburner in 1975 as part of their fire fighting school. The afterburner was installed under contract.

Purchased as a part of the Navy's compliance with air pollution regulations, the basic function of the afterburner is to burn off the smoke produced during the school's fire fighting training. The afterburner generates temperatures in the 1,700 - 1,800°F range to incinerate all particulates.

The afterburner is primarily a cylindrical metal stack with truncated cones on each end, lined with refractory, and equipped with a burner and smoke inlets. The original refractory consisted of a base of three inches of block insulation, a six inch stack lining, and a castable refractory gunited in place. The refractory-lined portion of the afterburner is about 45.5 feet high with a total height of about 60 feet. The afterburner is lined with about 2,000 square feet of refractory.

The school at Pearl Harbor operates an average of two times per week, six hours per day. The afterburner is operable all day once it is fired since an eight-hour preheat and postheat is normally required to control thermal stresses (expansion and contraction) in the refractory material.

The burner, however, can and is modulated according to the load and left at "idling" or low fire during periods when the afterburner is not required. Consequently, the annual propane fuel costs for the afterburner have been extraordinary. Also, the constant throttling type burner operation to accommodate the varying and intermittent nature of training procedures imposes severe thermal stresses on the refractory.

This thermal shock, over a period of several years, resulted in significant failure of the refractory. Primarily affected was the castable on the hot face (interior). Numerous large cracks developed throughout the surface, eventually spalling, and pieces of refractory of all sizes began to fall. This condition presented a serious hazard to both the burner head assembly at the bottom and to the personnel who had to enter the afterburner for debris removal.

Failure of the insulating refractory caused other problems such as blistering and peeling of the paint on the exterior surface of the afterburner. Several smoke ports (cylindrical ducts adjacent to the burner assembly which admitted the smoke into the afterburner) began to distort and warp severely and the burner tile around the burner head cracked and fell away. The condition of the afterburner consequently became marginal and significant failure of the castable refractory appeared imminent.

As part of a trial and evaluation process, a small portion (about 2 sq. ft.) of kaolin wool blanket was attached to the refractory near the burner assembly to reduce the castable temperature and retard spalling. After about a year's exposure, the kaolin blanket was in good condition and appeared effective in insulating performance and temperature resistance.

Based on this success and its obvious advantage of thermal shock resistance, investigation of an available commercial product with installation flexibility to suit this particular application was pursued.

The search for a suitable refractory substitute resulted in the "discovery" of a new refractory material. This product is a kaolin refractory fiber module assembled into an accordion-pleated fiber block with kaolin fiber blankets. Kaolin is a fine white clay used in refractory products and the manufacture of porcelain. These modules are basically composed of pleats of refractory fiber blanket material compressed into a 12-in. × 12-in. module and fitted with concealed, integral mounting hardware. Stainless steel support beams are buried in the fiber pleats next to the cold face (afterburner steel shell side) of the module.

Attached to the beams by means of stainless steel tabs is a stainless steel suspension channel which, in turn, fits into a stainless steel mounting clip. This mounting clip is attached to the afterburner shell by stud welding.

Corrugated cardboards and plastic banding keep the pleated material in compression (assembled) prior to and during application. After attachment to the afterburner shell,

these compression restraints are removed and the pleated refractory fiber blanket expands, producing a tight, gap-free insulating lining with all metal parts isolated from the hot face. All loose, non-compact areas are packed tight after assembly with simple slip-in type tools.

Research revealed that the use of refractory fiber modules is relatively new in the industry and no applications other than ovens and kilns existed. However, extensive engineering research indicated that the kaolin refractory fiber module would provide definite advantages for the afterburner.

The study showed that installation of the modules would significantly reduce repair and energy costs, increase facility reliability and safety, and provide a facility responsive to the training needs of the Fleet.

Other advantages offered by the modules over the original afterburner refractory: the modules will not crack or spall off in service, are about 80% lighter, have lower heat storage characteristics, are highly resistant to thermal and mechanical shock, are easily repaired, require no special curing or drying, and have high insulating values.

The modules can be obtained for service up to 2,600 degrees Fahrenheit and from 4-in. to 12-in. thickness (an 8-in. thickness was used to replace the original 3-in. insulating brick and 6-in. castable refractory in the afterburner). The modules are designed for a maximum exhaust gas velocity of 50 feet per second (about 18 fps in the afterburner).

The intermittent nature of the operations of the fire fighting school created a difficult service environment for any refractory. The continual severe cycling of the afterburner heat exposes this refractory to unusual thermal expansion and contraction (thermal shock).

The kaolin fiber material seemed like an ideal replacement for the damaged afterburner refractory due to its excellent resistance to thermal shock and high temperature properties.

Consultation with the manufacturer of the afterburner revealed that it was their opinion that there would be no adverse effect in replacing the existing refractory with the modules. In fact, the manufacturer was pursuing the use of kaolin refractory fiber modules in their products and fully concurred with the general concept of the repair of the afterburner.

Research also introduced alternative replacement materials for the warped stainless steel smoke ports and cracked burner tile. It was discovered that the kaolin refractory fiber is also manufactured into solid blocks which could be easily machined into almost any shape. The thermal performance of these fiber blocks is similar to that of the modules.

This material is cheaper than the stainless steel cylinders and burner tile that they replaced. Accordingly, holes were bored in solid blocks to produce smoke ports and a large block machined to replace the original burner tile assembly.

In view of the deteriorating condition of the afterburner, rising fuel cost, and the operational advantage of the kaolin refractory fiber modules, it was decided that kaolin fiber modules and blocks would be used to accomplish the repair. Because of the fire fighting school's workload and unrelenting class schedule, the contractor was given only three weeks to accomplish the on-site work. A factory installation engineer was present and assisted in the module installation.

Due to the state-of-the-art nature of the project, field changes and modifications were required to the standard module installation procedures. Nevertheless, the project was completed on time and the customer was rewarded with a facility that exceeded all expectations.

Fuel savings realized was double that expected: $2,240 per day vice $1,120 (estimated). The afterburner needs to be reheated only 20 to 30 minutes vice the extensive period required previously.

The burner is now shut down during lunch hour. No significant repairs or maintenance are anticipated during the life of the modules which is predicted to be five to ten years. Simple payback period for the project is six months based on an estimated annual savings of $232,960 per year and a $115,638 project contract cost. □

**AFTERBURNER AFTERMATH**

**Results:**

**$200,000* annual saving**

*ESTIMATED

What's happening in the way of . . .

# Metric Conversion?

. . . not much in the foreseeable future

By LEE E. ROGERS
*P.E., Mass.*
• Alexandria, Va.

Within the Federal Government, the Interagency Committee on Metric Policy (ICMP) was established in October 1978 under the auspices of the U.S. Metric Board to coordinate and provide policy guidance to the heads of the federal departments and agencies on metrication. The ICMP is comprised of senior officials from the executive departments and major federal agencies and is chaired by Dr. Louis Polk, chairman of the U.S. Metric Board.

Reporting to ICMP is the Metrication Operating Committee (MOC), which is comprised of the metric coordinators of 44 federal departments and agencies. MOC coordinates federal interagency activities and recommends policy guidance to the ICMP. Reporting to MOC are a series of nine subcommittees covering specific areas, one of which is "construction."

There is also an Interagency Committee on Standards Policy which is chartered by the Department of Commerce. It has recently created a Metric Standards Subcommittee to deal specifically with activities related to the metrication of standards.

There are considerable agencies within the federal government to deal with metrication and most of them led by the Department of Defense.

During 1979, the ICMP produced two major documents: first, the *Metric Conversion Policy for Federal Agencies,* and second, the *Federal Agency Guidelines for Implementation of Metric Conversion Policy.* In addition, MOC produced two documents for the proper use of the metric system by Federal agencies: *Metric Practice Guidelines for Federal Agencies,* and *Preferred Metric Units for General Use by the Federal Government.* The latter extracts more commonly used units from the nationally recognized standard. They are fully compatible except for the spelling of "meter" and "liter."

The *Federal Metric Policy and Guidelines* were published in the

*Federal Register, January 8, 1980,* to alert interested parties of their existence. These documents are intended to provide guidance to federal agencies in their metrication activities.

In the construction area, it is expected that General Services Administration's (GSA) Public Building Service, which provides, operates, and maintains space for most of the federal community, will become the lead agency in the metrication of federal construction activities. GSA owns or leases about 10,000 buildings throughout the United States. The Naval Facilities Engineering Command and the Army's Corps of Engineers, however, design and construct more facilities each year than GSA.

It is not intended that the federal government should take the lead role in conversion to the metric system; instead, the federal Government is ready to cooperate with industry.

Federal Policy states that federal agencies will conduct metrication activities in a coordinated manner, consistent with the objectives of the Metric Conversion Act and compatible with metric conversion trends. This policy naturally pertains to the construction industry.

Each Federal agency is to actively undertake coordination and planning, taking into account the interests, views, and conversion plans of other federal agencies, states, and affected parties in the private sector. They are to identify areas where metrication is dependent upon the agency's initiative and take appropriate action.

Further, agencies are to identify on a continuing basis, measurement-sensitive policies, and procedures for which it is responsible, and prepare new or revised regulations, standards, specifications, procurement policies, and, if appropriate, legislative proposals to remove barriers to metric conversion.

An example of this is the recent decision to revise the *DOD Construction Criteria Manual* to eliminate inhibitions to metric. Much of the criteria is dimensionally sensitive and the revision will eliminate barriers to metric.

It will also be a positive sign to the building products industry that DOD is willing to be a customer for metric design, metric construction, and metric products when these products and services are available and do not adversely affect the total cost of the project.

When the private sector has the capability to provide a metric design and construction at a competitive total cost, the agencies will consider the acquisition of metric construction to the maximum extent permitted by existing law and policy. Small business capability will be considered in development of agency policies and procedures as required by federal law.

During the past few years, a number of departments and agencies have developed metric policy directives. Others are in the process of doing so. The policy for the Naval Facilities Engineering Command was published on January 25, 1979.

Following the passage of the Metric Conversion Act of 1975, DOD, on December 10, 1976, issued a directive entitled *Use of the Metric System of Measurement*. This document was reissued on January 28, 1980, to reflect organizational responsibilities for implementation and management of the use of the metric system within DOD, and to establish a Metrication Steering Group. The DOD directive states that it is the policy of DOD to consider the use of the metric system in all its activities, consistent with operational, economical, technical, and safety considerations.

Further, it is DOD policy that the metric system shall be used in all new designs, unless such use is not in the best interest of the DOD. Existing designs dimensioned in the inch-pound units are to be converted to metric units only if determined to be necessary or advantageous.

A memorandum dated March 7, 1980, issued by Under Secretary of Defense Research and Engineering, Dr. William Perry, established a target date of January 1, 1990 for availability of a complete spectrum of metric specifications and standards which can be used in place of the 40,000 documents listed in the DOD Index of Specifications and Standards.

This does not mean a mass revision of the existing specifications and standards. Specific guidance regarding the preparation of standardization documents will be issued.

The DOD has, in line with this policy, adopted a series of non-government standards which are available for our in-house staff and the Architecture and Engineering (A&E) community to use now in designing metric facilities. The three primary documents are entitled *Standard for Metric Practice, Standard Practice for the Use of Metric (SI) Units in Building Design and Construction,* and *NBS Technical Note 990* which will soon be processed through the ASTM consensus standards procedures. It is titled *The Selection of Preferred Metric Values for Design and Construction*

Both standards are available for Government personnel from the Naval Publications and Forms Center, Philadelphia, as is the *American National Metric Council's Metric Editional Guide.* In addition, several non-government Standards bodies and technical societies have already begun or have established a firm schedule for issuing metric standards and practices.

The Department of Defense, for years, has been designing and constructing metric facilities overseas. Most, if not all of these were built by the American Construction Industry. Our in-house architects and engineers recently involved in either the actual design, or the management of design by private A&E's have reported a definite preference for working in metrics. Personnel in Federal construction agencies can look forward to the challenge and the potential benefits available through improvements in modular coordination and simplified calculations. □

# NOTES and EDITOR'S COMMENT

- Letters
- Can Do?
- Davisville Author

*Our first comment is that* reader's comments *are always welcome, in fact, encouraged. The nature of a quarterly publication prevents timely acknowledgment of correspondence received. We personally acknowledge correspondence as received and publish those that we consider of general interest. For instance:*

Thank you so much for the extra copies of the Civil Engineer (sic) magazine this month. Your time and assistance in this matter was most appreciated.

My only complaint is noted on the attached copy. Possibly you could indicate an erratum in the next edition.

Good luck in all your future plans and thanks again,

Yours truly,
William Collins
(LT, CEC, USN)
Charleston, S.C.
14 November 1980

*Thank you for a most gracious letter indicating our most ungracious error which appeared in your article "Most effective energy management—management action!" (p. 20, TNCE, Summer 1980)*

*The edited manuscript indicates that copy should have read "The algorithm readily established priorities and the minimum level of funding needed to affect significant repairs.* New technology *may be tempting as the solution to energy problems of the naval shore establishment but public works officers must not depend on complex technical solutions."*

*Somehow, the two words* "New technology" *disappeared, and their immediate location remains unknown nor have we had the courtesy of hearing from them.*

*Of course, this will be noted in the next edition. And again thank you for your interest, and we contritely regret the error.*

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Memorandum
From: CSO 20NCR
To: Editor, Navy Civil Engineer
Subj: Attached (Marked cover, and inside cover of TNCE, Vol. XXI, No. 1)

We have been unable to establish relationship of your cover to the CEC or Seabees. Can you help us out?

A. E. Corcoran
CDR, CEC, USN
20 NCR
Gulfport MS
25 March '81

*Gladly —*

*a. The relationship of the cover to the CEC or Seabees is contained on pages 14-15 of the same edition "Seabee Officer Training" authored by LT Gerald T. Frentz, CEC, USN, assistant director of military readiness division, CECOS.*

*b. (Cover notation 'Not a Seabee') The individual appearing on the front cover* is *a member of NMCB-40, portraying an aggressor as detailed in referenced article above.*

*c. (Cover notation 'Not an 81mm') The weapon being fired is* not *an 81mm mortar, nor was it so identified. The weapon is one peculiar to the aggressor forces.*

*d. (Inside cover notations) The individuals with mustaches circled are indeed members of the Civil Engineer Corps as indicated by the page title appearing upper left portion of the page.*

*The highly dramatic cover was photographed at no little risk to the photographer who is credited on page 14.*

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*And via the desk of Capt. John Shanley, CEC, USN, commanding officer of CBC, Port Hueneme:*

I am addressing this letter to you as a token of appreciation for an experience my wife and I had as visitors to the Port Hueneme Naval Installation. . .I refer to the CEC/Seabee Museum.

I have seen military museums all over the country: West Point, Wright-Patterson AFB, Fort Sill, Fort Huachuca, Fort Leavenworth, and numerous other places. The museum at Port Hueneme will hold its own with any of them.

As a veteran of the Pacific Campaigns of World War II, I relived nostalgic moments upon seeing the dioramas of the Seabees in action and the outdoor movie screen amidst the coconut trees. Shades of Tulagi, Rendova, Banika, Pavuvu, and all of those other rain-drenched islands so far away from home!

The inclusion of a chapel as a portion of the museum is a beautiful and touching addition. I did not meet the Director, LCdr Hark Ketels, USN (Ret.), but I feel that he deserves special commendation for the work he has done. We did chat with the museum's registrar, Mrs. Margaret Dallwig, who was most courteous and helpful.

I will recommend the museum to friends with the suggestion that when they are in the vicinity they drop in for a visit. It is a remarkable place.

Cornelius C. Smith
Col., USMC (Ret)
5218 Old Mill Road
Riverside, CA 92504
June 23, 1981

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I am an Engineering Technical/Drafting Instructor . . . my classes are in the process of rebuilding and reprogramming due to a fire that destroyed all of our materials in September of 1980.

*(Continued next page, please)*

## more of same. . .

I think NAVY CIVIL ENGINEERING (sic) can be an asset to the students here . . . Our problem is a lack of funds, as the education in this Correctional System is of very low priority.

If you can be of any assistance in this or any other way, including but not limited to a supply of damaged, used, or unsalable publications and/or texts in the technical/architectural drafting field which would be conducive to the educational goals of a beginning draftsman, please let us know.

Thank you for your consideration and support.

Max L. Lewis
Engineering Drafting Instructor
Washington State Reformatory
Edmonds Community College
P.O. Box 777
Monroe, WA 98272
May 18, 1981

*Mr. Lewis has already received back issues of* The Navy Civil Engineer *and a continuing gratuitous subscription. Now, somewhere we heard that the Seabee family "can do." Certainly among our readers there exist numerous volumes of technical material (particularly concerning drafting and engineering techniques) that could be of value to Mr. Lewis' classes. Readers having unwanted or unused books (in good condition, please) are invited to contact Mr. Lewis at the address shown above. Seabees, can do?*

As reported on recent pages of *TNCE* the Construction Battalion Center, Davisville, R.I., lives on and on in spite of "exaggerated reports of its demise." Thousands of Seabees, Civil Engineer Corps Officers and employees, who have been stationed off of Narragansett Bay, can relive certain memories with Walter K. Schroder's "Defenses of Narragansett Bay in World War II" (Paperback, Rhode Island Publications Society, 150 Benefit Street, Providence, RI 02903, $5.95 plus $1.50 mailing).

Extensively illustrated with period photographs, the publication reviews the entire coastal defense and military system of "the bay" from 1939 to 1945. Most of the harbor defenses have all but disappeared, but Schroder reveals some little known military aspects of the area, for instance, a U.S. Army "re-education" program of German prisoners-of-war as a German civil affairs cadre following victory and a literal 'last-hour' submarine attack in the bay's outer reaches.

Schroder, a native of Pawtucket, is still in harness at CBC, Davisville, as deputy contracting officer for NAVFAC. The volume, now in its 2d printing, has received widespread acceptance from WWII military buffs. For those who have visited Davisville, the book is a quick trip into nostalgia. For NAVFAC libraries it is a must! HW

Our apologies to CDR George A. *Rogers,* Jr., USN, whose by-line became converted into *Roberts* in his article "Contract Services: Necessary for Survival" appearing in the Spring 1981 edition. CDR Rogers, repeat Rogers, has graciously accepted the personal regrets from the entire staff: Howard Wells, Len Hilton, Billy Grimace, Lotus Briskett and Rota Vaquero.

You are particularly invited to participate in the semi-annual Readers Survey appearing on pages 47-48. The survey, which was initiated in 1967, has proven of great value to the editorial staff and the publishers in determining the contents and direction of the periodical. The response has always been indicative of readers needs and wants. This year, the survey is of particular importance.

NAVY CIVIL ENGINEER

## READERS SURVEY 1981

*Please Invest 3 Minutes of Your Time!*

## SUBMIT PRIOR TO 15 OCTOBER 1981

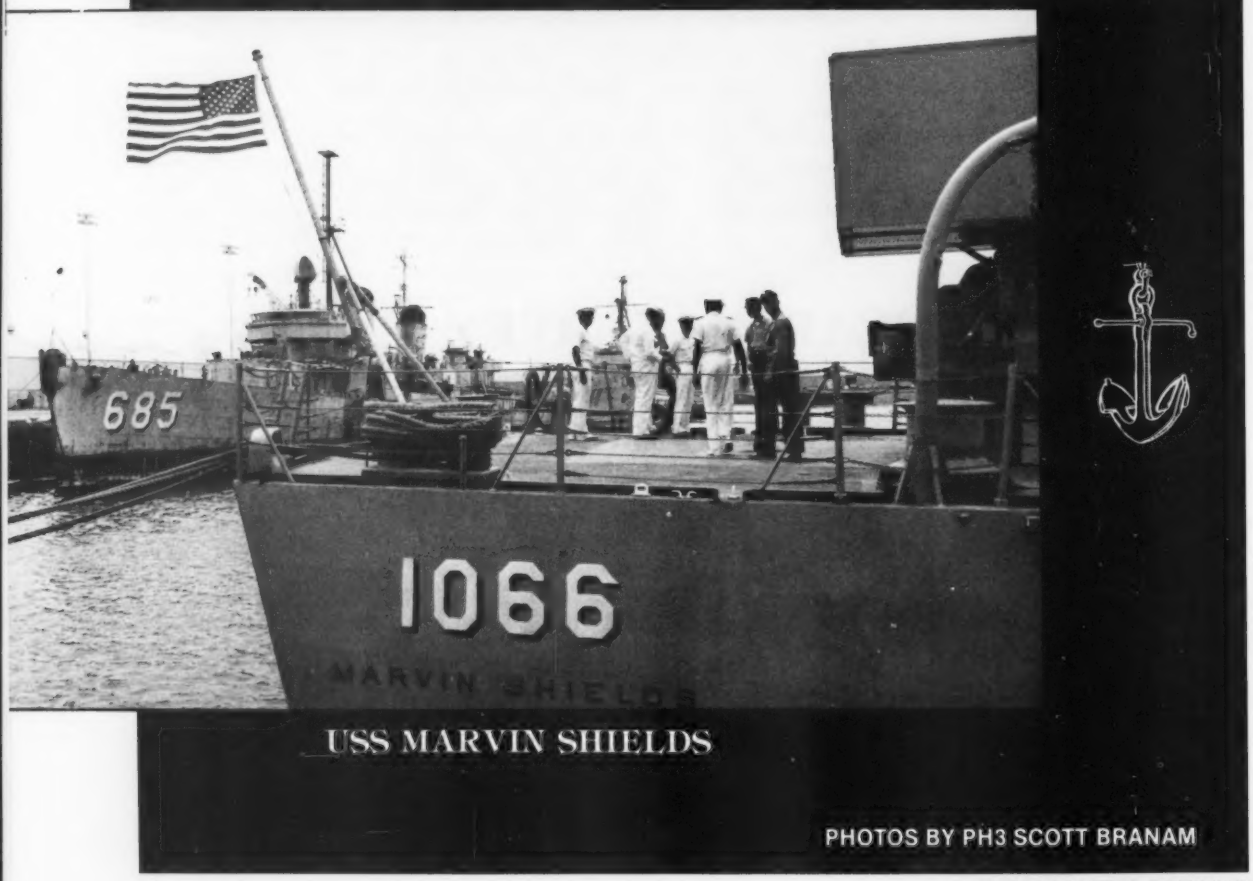
I AM ☐ USN ☐ USNR ☐ USNR (Inactive) ☐ Civilian Employee ☐ Paid Subscriber ☐ Other _____

I AM ASSIGNED TO ☐ NAVFAC ☐ ROICC ☐ EFD ☐ STAFF ☐ PWC ☐ RESERVE ☐ SEABEE ☐ CBC ☐ OTHER (specify _____)

MY GRADE IS _____
(Rank, Rate, GS-)

I have _____ years of accredited education (elementary, high school, college).
I hold a _____ degree in _____.
I have _____ years of government service (civilian and armed forces combined).
I have/have not contributed articles or material to The Navy Civil Engineer.
I have been a reader of The Navy Civil Engineer for _____ years.
I usually read: ☐ all; ☐ more than half; ☐ less than half; ☐ hardly any of the contents of The Navy Civil Engineer.

PLEASE TURN TO PAGE




USS MARVIN SHIELDS

PHOTOS BY PH3 SCOTT BRANAM

# the pride and professionalism of MARVIN SHIELDS remembered

Observing its tenth anniversary, the USS *Marvin Shields* returned to the homeport of its namesake recently for a two-day observation. The ship, named after Construction Mechanic 3d Marvin Shields, Seabee hero who was killed in Vietnamese action 10 June 1965 and was posthumously awarded the Congressional Medal of Honor 13 September 1966.

Civic and naval officials greeted the ship which is commanded by CDR John W. Allin.

Highlighting the formalities were the honors accorded Utilitiesman 1st Class Robert E. Zulick, who is the 1980 winner of the Marvin Shields Award, given to the outstanding Seabee of the Naval Construction Force. Zulick received the ship's plaque from CDR Allin, who in turn received a floral tribute from the Construction Battalion Center's Seabee Queen Tina Martinez.

UT1 Robert E. Zulick

CDR Allin, Zulick, Queen Martinez

# Naval Facilities Engineering Command

## SITUATION REPORT

**SAN DIEGO NRMC SITE SELECTED** - A section of the Florida Canyon in Balboa Park has been selected as the site for the new San Diego Naval Regional Medical Center (NRMC). The decision followed a thorough review of the environmental impact statement, public comment and 1981 GAO report and previous studies. In a notice of the decision to construct the Medical Center, Secretary of the Navy John Lehman said, "The expansion potential at the Balboa Park site is considerably more flexible than the Helix Heights site. If in times of national emergency or significant local disaster additional space was necessary, Balboa Park could be temporarily utilized by the Navy to provide medical service on a significantly expanded scale." Taking advantage of existing facilities, the new San Diego NRMC will be a complex consisting of a 560-bed acute care hospital, a 200-bed light care facility, out-patient clinics and all related administrative and support services. It will also include unaccompanied personnel quarters, recreation facilities, parking and a Naval School of Health Sciences. The entire complex will be specially designed and landscaped to blend with the natural habitat of Florida Canyon. In return for the approximately 36-acre site, the Navy plans to transfer approximately 39 acres of land currently utilized as part of the existing NRMC. This land will be landscaped to make it consistent and compatible with the existing park setting.

(NAVFAC Code 0523)

**$300 MILLION DIEGO GARCIA NAVY CONTRACT AWARDED TO JOINT-VENTURE FIRM** - The Navy has awarded a cost-plus-award-fee contract, valued at about $300 million, to a joint venture consisting of the Houston-based firms of Raymond International Builders, Inc., and Brown and Root, Inc., and the Middlesex, England firm of Mowlem International Ltd. The contract, one of the largest awarded by the Navy in recent years, is for new construction and major additions to existing facilities on Diego Garcia, a tiny island atoll located in the Indian Ocean. The Pacific Division of the Naval Facilities Engineering Command recently announced conclusion of successful negotiations with the contractor. The contractor offices will be headquartered in Houston with site offices co-located with Navy offices on Diego Garcia. The contractor is expected to employ approximately 1,000 people. The first contractor personnel are expected to arrive on Diego Garcia for preliminary investigation of the site later this month.

(NAVFAC Code 02/05)

## TECHNICAL NOTES

# Change Orders Speeded by Desk Calculator

By LT ROBERT L. PHILLIPS, CEC, USN
*P.E., Ind.*

and

ENS GARY W. FEMLING, CEC, USN
*E.I.T., Wash.*

• Crane, Ind.

Merely mentioning the words Change Order summons visions of project delay, $$$, negotiations, and additional government paperwork. Well, some relief is now available should it be necessary for an office to prepare cost estimates on the standard "Mark 1 - Mod 2" Government Estimate for Change Order Form.

The change order program, written exclusively for a well known calculator with printer and adapted to Northern Division's Naval Facilities Engineering Command, Government Estimate for Change Order Form, actually performs the numbers crunching process upon introducing the data for total estimated direct labor, material, and equipment costs and fringe benefits. A printout is received using this method. The process takes approximately 60 seconds to complete. The finished product can be attached directly to the standard government form saving time and eliminating clerical errors.

Although the program appears dishearteningly long (521 steps), the magnetic card capability of this type of calculator makes this process necessary only once.

Entering the program into the calculator requires three separate operations. First, the calculator's memory must be partitioned to 639 program steps and 39 memories. This is accomplished by pressing 4, 2nd, OP, 1, and 7. The display should register 639.39 at this time. Then, press LRN (the display should now be 000 00), and it is ready for the second operation.

Operation number two requires the introduction of all key symbols in steps 000 through 521 - enter the key only, not the step or code. Keys such as LBL or FIX require pressing "2nd" first, because these keys are "upper case" on the calculator. With the exception of steps 004, 022, 187, 205, 402, and 414, depress exactly what is shown in the key column. Although two numbers are shown in the key column of the previous mentioned steps, the correct procedure is to enter only the single right hand digit, in this case, a "0" or a "2."

It should also be pointed out at this time that the percentage factors used for the prime and subcontractor's liability and compensation insurance, and social security and unemployment insurance were 9% and 11% respectively. A 1% factor has been used for the prime contractor's bond premium. Therefore, in steps 126-128 (prime contractor's liability and compensation insurance), 144-146 (prime contractor's social security and unemployment insurance), 315-317 (subcontractor's liability and compensation insurance), 333-335 (subcontractor's social security and unemployment insurance), and 494-496 (bond premium), depress the percentage factor that is used when preparing the estimate. Upon completion of all steps 000-521, press the LRN key, and it is ready for the third operation.

Operation number three requires the introduction of the number codes, shown at the end of the program, into the calculator's memory location. This is accomplished by pressing the number code (i.e., 1027131435), then pressing STO and the appropriate memory storage location (i.e., 04). The number codes

PRIME CONTRACT WORK

| | |
|---|---|
| 14200.00 | LABR |
| 10100.00 | MATL |
| 5000.00 | EQMT |
| 29300.00 | SUBT |
| 2930.00 | OVHD |
| 32230.00 | SUBT |
| 966.90 | OVHD |
| 33196.90 | SUBT |
| 1278.00 | LIAB |
| 1562.00 | SS |
| 1562.00 | FRNG |
| 37598.90 | SUBT |

SUB CONTRACT WORK

| | |
|---|---|
| 500.00 | LABR |
| 300.00 | MATL |
| 50.00 | EQMT |
| 850.00 | SUBT |
| 85.00 | OVHD |
| 935.00 | SUBT |
| 28.05 | OVHD |
| 963.05 | SUBT |
| 45.00 | LIAB |
| 55.00 | SS |
| 55.00 | FRNG |
| 1118.05 | SUBT |
| 67.08 | PRFT |
| 1185.13 | SUBT |

SUMMARY

| | |
|---|---|
| 37598.90 | PRIM |
| 1185.13 | SUB |
| 59.26 | OVHD |
| 38843.29 | SUBT |
| 2330.60 | PRFT |
| 41173.89 | SUBT |
| 411.74 | BOND |
| 41585.63 | TOTL |

are used in this program as a means of labeling each individual line of the printout.

Now that operation three is finished the program is ready to run. Remember, *don't turn the calculator or printer off* because this will result in losing all the work that has been put into the program thus far.

Label keys have been used in this program to enter data and start execution. The following procedure is to be used when entering direct costs:

Prime contractor labor costs - Push A.

Prime contractor material costs - Push B.

Prime contractor equipment costs - Push C.

When computer stops,

Prime contractors fringe benefits - Push D.

When computer stops,

Enter subcontractor labor costs - Push A′.

Introduce subcontractor material costs - Push B′.

Enter subcontractor equipment costs - Push C′.

When computer stops,

Subcontractor fringe benefits - Push D′.

Remember, there must be an entry for A through D′ in order for the calculator to execute all the necessary steps of the program. A zero should be inserted when there are no direct or fringe benefit costs.

It is suggested that the program's operation be checked by entering the values for labor, material, equipment and fringe benefits costs shown in the printout. The printer output should be identical to that shown, provided the same percentage factors have been used.

Once it is determined that the program is working properly, it is recommended that it be stored on the magnetic cards that come with this type of calculator.

Two other programs have been written for the calculators with / without printer. *To obtain these programs or further assistance contact the authors at Autovon 482-1556.*

## Seismic Safety In Construction

A *Draft Seismic Standard for Federal Buildings* (NBSIR 81-2195) has been published by the National Bureau of Standards. Developed by members of the building standards subcommittee of the federal Interagency Committee in Seismic Safety in Construction, the 95-page draft is under review by various agencies. Afterwards, the subcommittee will revise the document before adoption as a federal buildings standard. The draft is available for $9.50 prepaid from the National Technical Information Service, Springfield, VA 22161. Use PB #81-163842.

## Handling Industrial Wastes

**By JEANNE A. YACOUB**
*Environmental Engineer*
*NAVFAC HQ*

• Alexandria, Va.

To prevent biological upsets at municipal waste treatment plants, the Environmental Protection Agency (EPA) has put into operation General Pretreatment Regulations for the Electroplating Category. These rules have a direct effect on the Navy and are intended to accomplish three goals: prevention of interference with the operations of a treatment plant; prevention of passage of pollutants in violation of permit limitations; and prevention of municipal sludge contamination.

Under these regulations, Navy operations are considered to be "integrated facilities," requiring compliance three years from the effective date of the Combined Wastestream Formula. The formula allows activities to compute limits based on a wastestream which combines one or more plating line wastes.

The Navy's Pretreatment Program is currently carrying out the EPA regulations. Over $50 million for electroplating shops and industrial waste treatment plants have been requested by Navy activities. These projects will provide the Navy with a modernized electroplating capability employing countercurrent rinse tanks and, in some cases, recovery units for various metals such as chromium. The savings in water usage and chemical purchases will provide an annual savings of millions of Navy dollars. If more metals are retained and reused in the plating lines, fewer metals are discharged to the treatment plants, eliminating the possibility of permit violations, plant upsets and hazardous waste sludges.

For those Naval complexes which must discharge a large volume of industrial wastes, collection and treatment facilities are being upgraded, expanded or constructed. The emphasis in construction or modification of industrial waste treatment plants is to acquire a facility which is easy to operate, is flexible in its treatment capabilities and is capable of producing an effluent which can be discharged directly or to a municipal sewer. □

# Laboratory becomes independent command

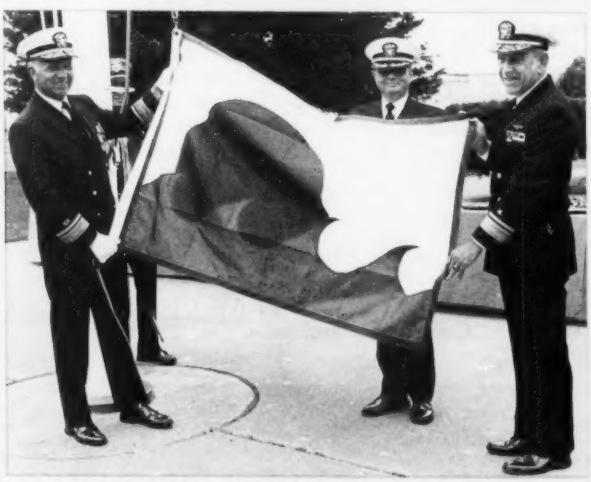
During brief but formal ceremonies July 1, the Naval Civil Engineering Laboratory (NCEL), Port Hueneme, was re-established as an independent shore activity.

RADM W. M. Zobel, Commander, Naval Facilities Engineering Command (NAVFAC) read orders that first disestablished the Civil Engineering Laboratory. Seconds later, he read another set of orders and directed Capt. R. N. Cope, former Officer in Charge, to assume command of NCEL as its commanding officer.

"Your status has changed but your mission has not," the admiral said when he addressed approximately 450 laboratory employees and invited guests and dignitaries during the commissioning ceremonies. He said NCEL "has impact on every aspect of the Navy. . . and is an important asset, an available resource."

U.S. Marine Corps Major H. L. Dietz, (foreground, top photograph) acted as adjutant of a staff of four officers. At the laboratory he is the liaison officer between NCEL and the Marine Corps which is sponsoring a $3 million research and development program. U.S. Army Major R. M. Fernandez, (second from the left) is head of the laboratory's support operations department. He is assigned to NCEL under a Navy-Army exchange of mid-management officers.

He is joined in ranks by three naval officers attached to the laboratory. They are (from the left) LCdr. W. F. Walker, director of the ocean operations division; Lt. T. J. Etheridge, director of contracts division; and Lt. M. Meyers.



COINCIDING with command change was the award of the Secretary of the Navy's energy conservation flag indicative of the lab's outstanding record.

RADM Zobel, Capt. Cope and RADM Baugham display the award following personal congratulations to the lab's energy conservation committee.

# Change of Commands

## CBC

### CAPT FRED G. KELLEY

Capt Frederick G. Kelley, CEC, USN, has assumed command of the Construction Battalion Center, Port Hueneme, Calif., relieving Capt John J. Shanley, Jr., who had been commanding officer since August 1979.

Capt Shanley will be reporting to the Naval Facilities Engineering Command (NAVFAC) in Alexandria, Va., where he will become the Deputy Commander for Facilities Acquisition. Capt Kelley is reporting from the Civil Engineer Corps Officers School (CECOS) at Port Hueneme, where he has been commanding officer since July 1979.

Capt Kelley is a registered professional engineer in the state of Mississippi. He is a veteran of the Vietnam War and previous to his CECOS assignment was the Executive Assistant to the Commander of NAVFAC in Washington, D.C.

## CECOS

### CAPT J. B. CAUGHMAN JR.

A native of Columbia, S.C., Capt Caughman attended Clemson University prior to entrance into the U.S. Naval Academy in 1954. He graduated with distinction from Annapolis in June 1958.

Following two years as Chief Staff Officer, 31st Naval Construction Regiment, he attended the National War College, Washington, D.C., from which he graduated in June 1979. He then reported for duty as Officer in Charge of Construction NAVFAC Contracts, Southwest Pacific, with headquarters located in Manila, Republic of the Philippines.

He is a registered professional engineer in the state of Wisconsin.

Capt Caughman has reported to Port Hueneme, Calif., as Commanding Officer, Civil Engineer Corps Officers school.

## NCEL

### CAPT J. H. OSBORN

Capt J. H. Osborn, CEC, USN, is the new commanding officer of the Naval Civil Engineering Laboratory (NCEL), Port Hueneme, Calif.

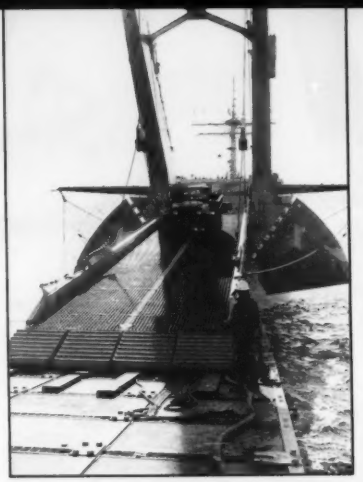
He assumed command July 24 during formal Change of Command ceremonies at the laboratory. He succeeds Capt R. P. Cope who was in charge of the research and development facility for three years. Cope has retired after 26 years of service as a naval officer to enter private business.

Born in El Paso, Texas, Osborn is a graduate of the U.S. Naval Academy. He attended Rensselaer Polytechnic Institute where he earned a BS degree in civil engineering in 1961 and at Texas A&M where he gained an MS degree in civil engineering, specializing in ocean engineering, in 1967.

A registered professional engineer in Texas, he is a veteran of the Vietnam War.

# Seabee Journal '81

15 pages of Seabee Candor



LST approaches for causeway marriage.

LST spits out vehicles down her ramp and over the causeway.

# PHIBCB-1 gets there with Marines!

By CDR J. M. RUGLESS, CEC, USN
*P.E., Wis.*

*"Land the landing force!"*

Simply stated, this is the task of the Amphibious Fleet. The Amphibious Construction Battalion (PHIBCB) role is to provide the bridge, in the form of a floating causeway, to offload Tank Landing Ships (LST) and to install pipeline facilities to supply the immense quantities of fuel that Marines would consume in an amphibious landing.

Unlike the Naval Mobile Construction Battalion, whose mission is construction of advanced base facilities, the PHIBCB is fleet oriented, afloat aboard a squadron of amphibious ships waiting for D-Day and the first assault wave to hit the beach.

"Construction" of the causeway consists of offloading (splashing) the causeway sections from their vertical storage positions — two on each side of the LST — marrying them together end to end, then inserting the resultant causeway pier (or bridge) onto the beach. Each causeway section measures 21 by 90 feet with the pier normally ranging from eight to twelve sections, depending upon the width of the surf zone and the gradient of the beach.

Once the pier is set and anchored in place, attention turns to fuel. Two transfer systems are in use, a buoyant hose for expedient installation in about three hours, and a steel pipe bottom lay system that follows the contour of the ocean floor and is installed for long term usage.

The buoyant system is housed on a large reel that spools out the hose as a warping tug holding the reel backs away from the beach to sea. The bottom lay system consists of sections of six-inch diameter pipe 30 feet in length. They are screwed together on the beach using hydraulic powered pipe tongs then pulled seaward by a warping tug. Each system is nominally 5,000 feet in length.

As each Pacific Fleet Amphibius Squadron (PHIBRON) deploys to the Western Pacific operating area, PHIBCB ONE adds a detachment of one officer and 25 men along with the hose reel, three sideloaded causeway sections and one warping tug, also sideloaded. Additional causways and warping tugs are prestaged in Subic Bay with PHIBCB ONE personnel on standby in Coronado forming an air detachment ready to deploy on short notice to augment the deployed detachment.

Now that each PHIBRON deploys to the Indian Ocean in response to the crises in Iran and Afghanistan, the PHIBCB ONE deployers have attached much greater significance and importance to both the professional and military homeport training programs. Causeway sideload, splash and pier insertion training is accomplished while providing LSTs their refresher training as part of their predeployment work up. Military training is conducted during an intensive two weeks at Camp Pendleton Marine Corps Base under the tutelage of Marine officers and NCOs from the Pacific Landing Force Training Command. This is followed by a third week of M-16 rifle qualification.

During the time at Camp Pendleton, the soon to deploy detachment learns to work together as a unit using both offensive and defensive tactics, getting live fire experience on a variety of ranges such as the jungle trail, combat town and the defensive perimeter. Weapons used are M-16 rifles, 81MM mortars, M-203 grenade launchers and M-60 machine guns. The training environment is shared with the Beach Party Team from Beachmaster Unit ONE who controls the beach lanes during the amphibious assault and the Marine Shore Party who commands the beach once the landing is made.

Although construction is not the primary mission of deployers, it is for the PHIBCB ONE steelworkers who find themselves surrounded with an unending number of causeways and warping tugs to assemble. Like putting together a giant erector set, causeways are a collection of hollow pontoon cans each 5′ by 5′ by 7′, joined by long 6″ by 8″ angles bolted to the cans. First assembled in the vertical, the causeway is then tilted over into a horizontal position for addition of a multitude of finish items, the "jewelry," such as deck gratings, bitts, hatch covers, and chain plates. Warping tugs are of the same construction but with much more specialized jewelry.

The mechanics of PHIBCB ONE come in two forms; the construction mechanics who tend the 225 items of construction, automotive, and weight handling equipment and the enginemen who maintain the 60 items of marine equipment. Both are kept fully employed due to the intensive PHIBCB ONE operational schedule both at sea and on land. Each beach operation with causeway or fuel elements includes a camp support contingent providing full tent camp berthing and messing facilities.

To add an extra challenge to the equipment operators, the syllabus for LST refresher training includes lowering her bow ramp onto the causeway pier then driving various tactical vehicles down the causeway and up the ramp into the ship's tank deck, then rotating on her turntable and returning to the beach.

Over the past year when not engaged in LST/detachment training, PHIBCB ONE has been primarily dedicated to the support of various new amphibious warfare systems under development by the Civil Engineering Laboratory. One project, Temporary Container Discharge Facility (TCDF), involved a 300-ton crane deck mounted on an amphibious ship for use in offloading a container ship at sea onto various forms of lighterage for transport to a shore area where there are no port facilities.

The TCDF has been developed recognizing that nearly all cargo shipped commercially is by container, and that commercial shipping will be heavily relied upon to support future contingency operations. A second project, Offshore Bulk Fuel System (OBFS) is a single point moor anchored to the ocean floor that provides a ship moor for a fuel tanker as well as a fuel transfer connection to feed two eight-inch steel fuel lines. These lines run from the shoreline along the ocean floor then rise to the moor. This system is designed to operate up to 10,000 feet from shore. Both the TCDF and the OBFS when approved for service use will provide increased capabilities and tasking for the PHIBCBs

PHIBCB ONE is a diverse organization, half fleet oriented, half construction trades, capable of operating equallly well on land or at sea with but a single goal in view — get those Marines ashore! □

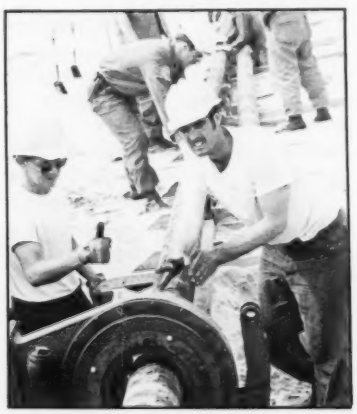
# *Key participant from Norway to Garcia*

**By CAPT A. S. POOLE, CEC, USN**
*P.E., Va.*

The pounding of the surf is so loud that at first the engines straining at full RPM provide only a background murmur to the noise of the six-foot waves breaking on the beach. Gradually the roar of engines overpower the ocean and a line of LVTs break through the waves and trundle into the sand dunes spewing marine assault teams. Beachmasters quickly set up flag markers as LARCs and the PHIBCB beach salvage team bulldozer moves to assist with the causeway beaching.

Louder engines are now heard as the PHIBCB Mike 6 tenderboats muscle their equipment loaded chain of 90-foot causeway sections through the surf. Camouflaged Seabee equipment rolls off; anchors are quickly placed by tenderboats to hold the causeways in position as LCUs make their approach to the seaward end to unload Marine equipment across the Seabee bridge. Throughout the day the LSTs and Ds of the Amphibious Ready Group offload their cargo of equipment and supplies; by nightfall the beach is secured.

In the following days the PHIBCB will place up to 5000 feet of floating fuel lines from ship to shore, ferry the resupply material and equipment ashore, and ultimately assist in the reloading of the expeditionary force



BOTTOM lay steel pipe is being assembled for tow to sea.

to perform another such landing, perhaps a thousand miles and 10 days away. This all is the Navy/Marine Corps amphibious team in action.

The scene described was repeated during the past year from the fiords of Norway to Diego Garcia in the Indian Ocean. In every such landing Amphibious Construction Battalion Two (PHIBCB-2) has been a key participant in the Navy's operational combat capability.

Unlike the Mobile Construction Battalions (MCBs) who work for a Seabee Type Commander, PHIBCB-2 is located within the Naval Beach Group, a part of the Atlantic Amphibious Group. There is consequently only one PHIBCB in the Atlantic and assignment to a tour of duty with the unit is exactly what the old recruiting posters promised — travel, adventure, excitement, and most of all, fun.

The mix of six Civil Engineer Corps and nine line officers, the boats and construction equipment, operational duty afloat, and management work ashore provide the kind of broad experience in one tour that most officers in the Corps take years to garner — not to mention, of course, an opportunity to earn sea pay. To summarize, PHIBCB duty is truly unique for the Civil Engineer Corps officer.

But to get a real idea of what a tour in PHIBCB TWO is like, let's follow a mythical LTJG (CEC) "Bull" Dozer, CEC, USN, who reports aboard and track him through his first tour. (This should be interesting!)

We can skip the part where the detailer tells him what a great job he's getting; nobody believes the detailer, anyhow.

LTJG Dozer upon learning of his assignment immediately goes for his P-1 (CEC Directory).

"Six CEC officers?" he asks himself.

"Seems like a pretty small fish," he says as he compares the list to the fourteen or so names he sees under an MCB.

"Oh well, it all counts on thirty," and off he heads to Little Creek, Va. — wherever that is.

"Welcome aboard, Dozer!" says the Captain. "This is a super outfit and you'll really like it here."

LTJG Dozer notes to himself that the CO and the detailer use the same script.

"I'll wait and see," he thinks.

"You'll start out in Waterfront," says the Captain, "until we can get you in the *Rules of the Road* School, the *Amphibious Trainer* and *Embarkation School*. We've got you scheduled for MARG 3-81 as the OIC and you'll be 'pomming' your team in about three months when you get your feet on the ground. The first thing though is to get ready for your SMI. Causeway rig out, hoisting and splashing knowledge will come slowly, but don't worry. Your Chief Boatswain's Mate knows the ropes and he'll show you how to work with a 'T.' Good Luck!"

"What language do they use here?" Dozer wonders, "and why aren't these other officers I see wearing the CEC collar insignia? On top of that, who are all these clowns running around in camouflage uniforms? This place is nuttier than CECOS."

In the next three months LTJG Dozer learns that MARG 3-81 is the third Mediterranean Amphibious Ready Group to deploy for six months in 1981, that "pomming" means to prepare for overseas movement, and that the SMI is a supply/material inspection of his men and equipment to ensure that they will be ready for deployment.

He also learns that his twenty-eight man team will be almost a 60-40 mix of Navy general service ratings such as boatswain's mate and enginemen along with his familiar Seabee ratings of constructionmen and equipment operators (CMs). The "T" is an LST that will carry, side loaded, four eighty-ton causeway sections that he, LTJG Dozer, will, at the drop of the PHIBRON commodore's hat, put into water and take back aboard using his tenderboats and "rig" of pendants, flounder plates, fairleads, swivels, chains, turnbuckles, and equalizers, all of which give him a thirteen to one mechanical advantage over the LST's twelve-ton deck winches.

Soon LTJG Dozer is thoroughly confused with everything.

"How can I be responsible for all of this?" he asks himself. "Not only does that hard nosed OPS officer want me to train my people, practice operations, and keep everything running, but he wants it to look good,

ASSAULT craft Unit 2 LCU discharges equipment

too. Don't these guys know that saltwater makes things rust?"

Somehow, LTJG Dozer struggled through his POM to the ORI (he soon learned this meant Operational Readiness Inspection, an evolution designed to see if he had learned his business). His causeways were beached without broaching; the men somehow seemed to know what to do from the seemingly incoherent shouting of the chief, the fuel line got laid, and the captain gritted his teeth and muttered under his breath only two or three times while watching Dozer and his men perform.

All too quickly it seemed to LTJG Dozer, he was loading his equipment on the MARG ships. A quick handshake and a "Good Luck" by the C.O., and the next thing he knew the coast line of Virginia was fading astern.

The following six months were a kaleidoscope of shipboard life, bridge watches and good liberty interspersed with lots of hard work. Portugal, Spain, Greece, Israel, the Suez Canal, Kenya, and the Indian Ocean all passed under the keel.

Pounding surf, gritty beaches, broken propeller shafts, broached causeways, but overall a real sense of accomplishment as Dozer ran his piece of the amphibious landing in every country with the professional Navy team he had put together and now directed.

As the first line from the LST went over to the pier at Little Creek, with the waiting band, colored balloons, "welcome home" signs, and the cheering crowd, LTJG Dozer felt an amazing sensation of pride and satisfaction.

"Not many guys get to be the C.O. when they're LTJGs," he thought to himself. "The detailer and the skipper knew what they were talking about."

During the first two months back at the camp he oversaw the DEPOM (he didn't even have to ask what this meant), his men headed off for leave, and he found out he was to be the "A" company commander with responsibility for 300 pieces of construction and transportation equipment.

"Finally," he told himself, as he settled back with his *Navy Times* and a cup of coffee in his new "A" Company Office, "I've got it made."

Just then, Master Chief Hardnose stuck his head around the corner. "The CESO people are here for *A square, R square,* Mr. Dozer, and they want to start by reviewing our bottom lay tongs and pipe trailers. The camp support equipment and the 140-ton ELCAS crane are also hot items this year. Shall I show them in?"

"Huh!" said Dozer, spilling his coffee down the front of his khakis. "A square, R square? Bottom lay? Camp support? TOA? I didn't have those on my team. The C.O. must be reorganizing again."

Much to his chagrin, Dozer went back to work and began learning that a PHIBCB is also structured to support a full battalion deployment capable of supporting a Marine Amphibious Force over two colored beaches. He learned about desalinization plants, electric power systems, warping tugs, portable machine shops, and what seemed like a thousand other pieces of strange paraphernalia. He also became heavily involved in the reserve program since it turned out that a big part of the PHIBCB mobilization capability came directly from the weekend warriors.

It would take too many words to tell you everything that LTJG Dozer learned as "A" Company Commander. Suffice it to say that in a short time he became the resident expert in a whole range of specialized amphibious skills, all of which tasked his ingenuity as an engineer. Many months later the captain called him into the office. "What's up, Skipper?" he asked with the confidence of a seasoned veteran. "This is Ensign F. E. Loader, 'Bull.' He just reported from CECOS, and I'd like you to show him around."

As they left the office, the captain could hear LTJG Dozer saying, "You should POM for MARG 2-82 if the rig and boats work out OK on the T. Don't sweat your ORI, its a piece of cake."

ENS Loader seemed thoroughly awed. □

# *Rota tests readiness posture*

By LT J. A. McCONNELL, CEC, USN
*E.I.T., Penn.*

There is a subtle shift occurring in the concept of military readiness as it applies to the Seabees, which has been felt strongly in Rota, Spain. A deployment to Rota comes with all of the many prerequisites and trappings of any deployment site.

There is a tight construction schedule which often dictates a six-day work week. There is the usual mount-out exercise early in the deployment; there are training Saturdays, yet there is ample opportunity for travel and discovery in a far away land.

Perhaps unique to Rota is the emphasis placed on the ability of the resident Seabee battalion to react in different ways to the varied and constant threats posed by international terrorism, political instability and tensions in the Mediterranean area. When weighed against the perceived threat, military readiness becomes a function of strengths and weaknesses.

Policy states that Seabees must be capable of defending themselves while carrying out their primary construction support mission, however, the defense motive is but one component, albeit an essential one, in the overall scheme of readiness.

The battalion deployed to Rota assumes the role of Atlantic alert battalion and becomes intimately involved, in a contingency sense, with battle damage repair, rapid runway repair, operations security, base defense, and the European alert system.

Each represents a new or emerging element in the Seabees' military readiness posture and the battalion is probably not fully prepared upon deploying to carry out the responsi-

EO2 Charlie Martin makes his way up a hill after surviving an enemy "attack."

bilities it immediately assumes.

During its recent deployment to Rota, NMCB-4 was not unlike other battalions in this respect.

Shortly after arrival, the air det OIC, the intelligence officer, and the operations chief traveled to the outlying battle damage repair sites to familiarize themselves with the areas and to gather information necessary to update existing battle damage repair plans. They found that the battalion had to overcome the lack of formal training and the prevailing deficiency in material preparedness to best develop their emergency response.

Operations security, a concept many have heard about but few have actively practiced, takes on greater meaning at a European deployment site.

The alert battalion must have in place an aggressive operations security program which includes the continuing education of all hands and the constant monitoring of program effectiveness.

Base defense is not a new concern for the Seabees. At Rota, the resident battalion plays a major role in defending both U.S. and Spanish interests at the sprawling naval station. React forces must be trained and drilled; alerts allow little time for deliberation, and the battalion must be prepared to respond properly.

Spain's infant democracy and its concomitant economic and political unrest as well as the base's proximity to vital land bases and sea lanes make this imperative.

There are other more familiar factors which contribute to the readiness posture of the battalion. Physical conditioning, always a concern, becomes more critical when confronted with the possibility of operations in the arid and demanding Eastern Mediterranean.

Weapons familiarity and proficiency is an obvious priority as is the continual education of the troops in tactics and survival techniques. There is the constant question of how best to manage, train and monitor battalion personnel when many are on detachments scattered throughout the Mediterranean area and in the Persian Gulf, Scotland, and Diego Garcia.

At a point near mid-deployment the alert battalion goes into a one-week military reassessment.

The battalion was divided in half and for two nights went through a mini-field exercise. Marines from the local Marine barracks were convincing in their role as terrorists, testing the Seabees on fire discipline, light and noise discipline, fire planning, and adequacy of defensive positions.

All of this is not meant to imply that military readiness was the only concern of NMCB-4 during their deployment to Spain. Certainly the major effort and emphasis remained on construction and a wide assortment of worthwhile projects was undertaken by the main body and detachments.

The European deployment site was educational; a first-hand lesson in political reality. The battalion received valuable exposure to the sensitive balance of power in Europe and the Mediterranean, to the defense networks which establish the balance, and to the small but vital role that the Seabees play in maintaining it. □

# *Seabees aid Palau expansion*

By LT W. F. BOUDRA, CEC, USN
*E.I.T., Ark.*

Reminiscent of the famed Seabees of the World War II era, Seabee Teams on Palau are currently parting the islands' tropical jungle for new road networks. From May 1980 to January 1981, the Seabees were the men of Seabee Team 0525 of U.S. Naval Mobile Construction Battalion Five.

Using construction techniques perfected by their Seabee predecessors in the early 1940s, the men of Seabee Team 0525 sliced through the jungle to aid the Palauan people achieve their goal for future expansion and agricultural growth of inland territory.

The Palau Islands lie due east of the Philippines in the Western Caroline Islands chain. Babelthuap Island, where Seabee Team 0525 was located, is 27 miles long and 6 miles wide. It dwarfs the other Palauan Islands by comparison due to the absence of interior roads and has remained sparsely populated with only small fishing villages around its perimeter. To open up the heartland of the island and to provide a farm-to-market land route to the capital city of Koror, the Palauan government asked for U.S. Navy Seabee Teams to build a new road across the rugged mountains of Babelthuap to the coastal villages. The Seabees accepted the assignment and in the summer of 1978 began work on the first nine mile project.

The new road follows the remains of a pre-World War II mountain trail built by the Japanese. As noted by the team's Senior Equipment Operator, EO1 Jesse Yocum, "That old road was not much to go by, but was a start." The earth moving equip-

ment that Petty Officer Yocum used is a newer version than that used in the 1940s, but the basic construction techniques are the same. The equipment operators clear back the jungle for a right-of-way, shape the road bed, work in the drainage and use locally dredged coral aggregate for the road's wearing surface.

Although initially straightforward, the project faced one problem which required flexible scheduling of men and equipment. During the team's deployment, rainfall averaged over 15 inches per month and in June 1980 over 20 inches of rain fell. The clay soil, when wet, became too soft and too slippery to work on safely with construction equipment. On rainy days, Petty Officer Yocum would split his crew of two equipment operators and four Palauan trainees between hauling and stock piling the dredged coral and assisting the team's two construction mechanics in the equipment shops.

Through the experience the team found that 1000 cubic yards of coral stockpiled near the construction area could be spread and compacted in about three days which was about the most continuous good weather that could be anticipated.

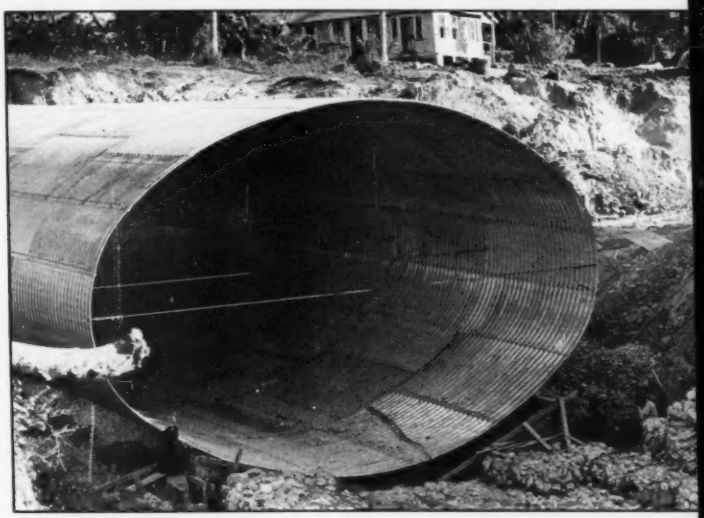
The team also found that most of the scheduled equipment repairs and major maintenance could be completed during the rainy periods.

When a new section of roadway was ready for coral surfacing during good weather, the placement of the coral became an involvement for all hands. The objective was to get as much coral in place and compacted in as short a time as possible. In addition to the regular crew, for example, it wasn't unusual to find HM1 Ron Underwood, the team's medical corpsman, at the coral stockpile loading dump trucks with the front-end loader and CE2 Fred Guarino, a construction electrician, behind the steering wheel of that five ton dump truck hauling the coral to the working area. The non-equipment oriented members enjoyed the chance to use the equipment operator cross-rate training they had learned in the homeport training period.

By deployment's end the team had cleared 2½ miles of right-of-way through the jungle and had hauled and placed 766 truck loads of coral in extending the finished roadway another mile through the rugged terrain. Termed the Airai-to-Neklen road project, the job was one which challenged the team as a whole. It was only one aspect of the team's construction program on Palau, but it exemplified the team concept in doing heavy construction as established by predecessor Seabees. □

# *NMCB-40: Specialists in disaster relief*

By JO3 DAVE ROBSON



A MAJOR Jamaican highway was bridged and repaired with this giant culvert serving as a drainage channel.

Naval Mobile Construction Battalion Forty (NMCB-40) is now in homeport, but it won't be for long. In September 1981, the battalion deploys to Guam for eight months, with detachments to Diego Garcia; Yokosuka, Japan; Yap Island; Honolulu, Hawaii; and Adak, Alaska.

Past deployments have taken the full battalion to Diego Garcia, Puerto Rico and Jamaica, and Rota, Spain. The 1979 Puerto Rican deployment proved to be a massive disaster relief operation; the 1980 homeport involved the battalion in flood recovery work at Point Mugu; the 1981 Guam deployment will take place during the Pacific typhoon season.

Since the battalion has been heavily involved with disaster relief in the past, and since we have every reason to expect more of the same in the future, more than 70 percent of NMCB-40 personnel are undergoing Disaster Recovery Training (DRT) as part of their homeport training plan.

In February 1980, NMCB-40 was called upon to assist NMCB-5, NMCB-3 and the Army Corps of Engineers. NMCB-40 had provided equipment operators earlier for earth fill and levee repair work when torrential rains deluged the area and the Calleguas Creek levee broke. Disaster relief operations included work on the Revlon Slough dikes east of Point Mugu.

Hurricane David roared through the island republic of Dominica in early September 1979, with winds in excess of 130 miles per hour. Most island buildings were severely damaged or destroyed and crops were destroyed. NMCB-40 airlifted a detachment of 70 men under the command of LCDR Michael Had-

bavny with essential equipment and supplies to conduct recovery operations. Seabees and refugees lived in adjacent campgrounds near Roseau, Dominica's capital, where they aided residents in emergency rebuilding.

However, the same hurricane's worst work was done at Jamaica, where the battalion sent a detachment of 90 Seabees under the command of LT (now LDCR) Glen Rodriguez assisted by 70 Marine bridge-builders. Meeting the emergency required restoring roads and bridges to open lines of communication to flood-stricken areas. In many cases, these areas were inaccessible. Men were required to shape roads and rivers from scratch, and often by hand. More than 2,000 gabions lining the roads and rivers of Jamaica, containing more than 6,000 tons (12 million pounds) of hand-placed stone bear perpetual witness to NMCB-40's "helping hand."

The battalion's most challenging task was reseating the Barham Bridge. This 110 ton span, crucial to the area's sugar cane economy, dropped into the water when floods washed away one of its two supporting abutments.

LT GLEN RODRIGUEZ guides Jamaican Boy Scouts in flood recovery efforts.

Road repair work was another facet of the Jamaican recovery operation. Route A-2, a major highway on the island, was washed out by floods near Bluefields, Jamaica. To repair the present damage and prevent future washouts, Forty's Jamaica Det channeled the river with gabions, installed more gabions in a stairstep pattern at the waterworks, and rebuilt the road over a giant culvert called a "superspan." The superspan served both as a permanent drainage path for the river and a steel archway supporting the road. For these works, and others, NMCB-40's Jamaica Det was honored by a visit from the Jamaican Prime Minister, Michael Manley, and recognized for humanitarian service in the *U.S. Congressional Record*.

As NMCB-40 looks forward to Guam in typhoon season, and beyond to the future, it is with the confidence coming from a proud record of past production, achievement, and humanitarian endeavors. □

# *"Battle weary" NMCB-74 holds ground against "aggressors"*

By ENS BRUCE A. REICHERT, CEC, USN

The war began for NMCB-74 on a Thursday night.

Five-ton trucks loaded with Seabees in combat gear traveled the dusty roads of Camp Shelby, Miss., to the bivouac site. This is where the Seabees would spend the night, prior to their tactical march into an enemy held area to establish their camp. In the distance the sound of M60 machine-gun fire and the explosion of light anti-tank weapon rockets could be heard.

The goal of NMCB-74 was to conduct a field training exercise that was as realistic to actual combat as possible. Simulation was to be kept to a minimum. Each man was to use the combat skills he had learned in the classroom during the preceding days. The exercise would involve an overnight bivouac, a tactical march, construction of a battalion camp, and defense of the camp for a 24-hour period.

Several times during the march there was contact with enemy forces. Brief fire fights ensued, but the enemy would quickly withdraw. These enemy attacks were designed to harass the battalion and slow it down.

It wasn't much later that a helicopter passed overhead with machine guns roaring. The concealed Seabees returned fire with their M16A1 service rifles.

As quickly as it appeared, the helicopter was gone and the battalion resumed its trek to the camp. As the Seabees arrived at the camp area, a hasty defense was established. This was to provide security during the difficult task of constructing all the camp facilities to house, feed, and support the 700 men of NMCB-74.

Enemy fire was encountered during the camp construction and throughout Friday night and Saturday morning. The enemy had little luck penetrating the defensive perimeter.

Recon patrols were dispatched to gather information on enemy positions. The information was used by the battalion fire support coordinator to direct fire from the battalion's mortars as well as request fire from supporting Marine artillery.

As the evening progressed the tempo of the fighting decreased. Was the enemy weakening? At 2200 the battalion received its answer as the aggressors mounted an all-out attack to penetrate the perimeter. The final protective fire was signaled and through a combination of well placed M16, M60, and 81mm mortar fire, the aggressors were repelled.

Again the tempo of the fighting decreased until just before dawn Saturday morning. At approximately 0400 it appeared the aggressors would penetrate the perimeter. It was the battalion's mission to force the enemy into their second option. Again, final protective fire was signaled and again it was successful. The enemy was repelled for the last time and withdrew.

Valuable information was learned from the exercise and it was a weary but wiser group of Seabees that later disembarked from the busses at their Gulfport homeport. □

# *Gulfport Homeport Stays A Busy One For NMCB-133*

JOSA DAVID ROURK

THE CREWS used tilt-up construction for the BOQ and BEQ buildings.

NMCB-133's deployment during FY80 was to Diego Garcia during the increased presence of the U.S. Fleet in the Indian Ocean. At the beginning of the deployment, NMCB-133's Commanding Officer CDR Herbert H. Lewis, Jr., CEC, USN, had three words he selected as goals for the deployment; *productive, flexible* and *supportive.* Throughout the deployment these words and goals were emphasized and were reflected in project sites, offices, warehouses, shops, clinics, and galleys.

It took two months for NMCB-133 to construct nearly 120 structures. The biggest task was to construct a 1000-man seahut camp. During the 60 days in which they completed the job, the crews built two to four, 32 or 52 feet long, seahuts a day, along with 30 other structures ranging from head and shower facilties, to metal prefabricated recreation and galley buildings. The huts were used to house transient personnel until BEQ and BOQ buildings were completed, which was to prove to be one of the more ambitious projects for NMCB-133. For the battalion's Charlie and Delta Companies it was big time construction, consisting mostly of concrete and steel work.

The Gulfport homeport period following the Diego Garcia deployment also proved to be an outstanding period for NMCB-133. A wealth of projects supplied the battalion with on-the-job training, on and off base, preparing them for their next deployment.

On Aug. 9, 1980 the second worst Caribbean hurricane experienced this century ripped through Southwest Texas. Within four days NMCB-133 had a 35-man disaster recovery team at the Naval Air Station, Corpus Christi, Tex. Twelve days later the men had the Naval Air Station functioning efficiently.

Another project during the battalion's homeport period was at Percy-Quinn State Park in McComb, Miss. The park's water drainage system was inadequate. To eliminate the possibility of flooding, the crews cut the old spillway, moving approximately 60,000 cubic yards of earth and reshaped the boundaries. The project saved the state of Mississippi over one-half million dollars.

In Oct. 1980, in recognition of NMCB-133's achievements, the battalion was presented the Atlantic Fleet 'best of type' battalion award for FY 1980.

In March 1981, NMCB-133, which is presently deployed to Guam, received the news that it had been awarded the Peltier Award due to outstanding performance, high quality construction, and unexcelled morale while deployed to Diego Garcia and during homeport. □

# *Hiatus not detrimental at Davisville*

**By JOAN O. GARDNER**
*Editor, Davisville Yardarm*

"Mobilization preparedness" can mean many things to different people.

At the Naval Construction Battalion Center, Davisville, R.I., however, mobilization preparedness is the product. Even in peacetime the subject transcends the brainstorming stage as ideas are put in motion to test and improve mobilization manpower and equipment resources.

For a number of years the Davisville Center has provided a permanent drill site to four units of the Reserve Naval Construction Force (RNCF): Reserve Naval Construction Battalion Center, Davisville (RNCBC, Davisville); 7th and 21st Reserve Naval Construction Regiments (RNCR s), and Reserve Naval Mobile Construction Battalion 12 (RNMCB-12).

These units perform their regular weekend training at the station. Over the past year, however, the center assumed another vital role as it was chosen to host two reserve battalion active duty for training (ACDUTRA) periods. The first was held in June 1980 and involved a composite battalion of some 350 Reserve Seabees assigned to units mostly from

SEABEES construct rappelling tower for military training.

the northeast U.S. The second, in which cold-weather training was emphasized, involved RNMCB-20 from Columbus, O., and was held in February 1981.

Reflecting on the June 1980 ACDUTRA, the first at Davisville since the base was phased down in 1974, no one dared predict how successful the reserve training program would be or how quickly it would grow.

The first ACDUTRA required months of preparatory discussions among center personnel, its reserve counterpart RNCBC, and the 21st RNCR. Hosting a composite battalion of Seabees required reactivation of several facilities, key of which were the mess hall and the barracks. These facilities and many others became functional in rapid time. Services associated with personnel (such as feeding, berthing, paying, and recreation) not performed at Davisville in several years, were put into operation. A comprehensive training curriculum was developed by the 21st RNCR. Training aids were obtained, classrooms and equipment were readied, and the program was off and running. Doubts, if there were any, about Davisville's capability to handle large numbers of Seabees after a long hiatus were dispelled. Facilities and support proved excellent for Seabee training.

In addition to a 77-acre equipment operator training area on base, Davisville's nearby Camp Fogarty provides a 375-acre tactical training area for military exercises and firing ranges.

A special hands-on firefighting course was conducted with the assistance of the Rhode Island Port Authority Fire Department located at adjacent Quonset Point. This being the first time in over six years that Seabees in substantial numbers were seen in the Davisville area attracted considerable media attention; the exposure was good for the Seabees and for Davisville.

Planning then began for an even more ambitious cold-weather ACDUTRA in February 1981. Employing the "Total Force" concept — all military services, active and reserve, working in concert — the February training period was a real test of mobilization readiness for trainers, trainees, and the civilian complement of the center. Total Force was also the subject of a documentary filmed during that period by a combat camera crew from Atlantic Fleet Audio Visual Command, Norfolk, Va.

RNMCB-20 came to Davisville well prepared for several challenging tasks. Operation plans for the battalion included classroom, warfare, and Arctic condition training and work on a number of construction training projects: a 60-foot rappelling tower for military training at Camp Fogarty and a crane lift test pad in the heavy equipment area at the main Davisville complex; refurbishment of six SEA huts, rifle range backstops, theater stage, and administrative spaces. In addition to the benefits to the Seabees who were able to demonstrate and refine their skills, the Seabee Center benefited from the construction left behind.

Part of the military training was a tactical construction exercise at Camp Fogarty, including an overnight bivouac, and crew-served weapons training, which was conducted at Camp Edwards, Mass. The highlight of the February ACDUTRA was an 89-man Air Detachment exercise, which originated at adjacent Quonset Point and terminated at Otis Air Force Base on Cape Cod, Mass. The airlift was provided by the 143d Tactical Airlift Group of the Rhode Island Air National Guard, part of the Total Force. Upon landing at Otis AFB, the detachment marched two miles to Camp Edwards, set up camp, worked on minor projects, and bivouacked overnight. The following day they motor convoyed back to Davisville.

The diversity and quality of training and the manner in which it was administered generated a great deal of enthusiasm among participants. In fact, men from RNMCB-20 volunteered to work on the rappelling tower over their weekend, foregoing liberty in order to complete the project. CDR Kenneth J. Gutzwiller, commanding officer of RNMCB-20, reported, "It was the best ACDUTRA, bar none, that I've ever experienced."

Enthusiasm has remained high. Coincidentally, Davisville's construction equipment department received a request from the Commander, Construction Battalions, U.S. Atlantic Fleet to assemble and test an asphalt plant. This was viewed as another opportunity to exercise skills important to mobilization. An invitation went out to units of the Naval Construction Force to assist in the assembly. Reserve Seabees from RNMCB-23, RNMCB-13, and the 21st RNCR were detailed to Davisville for the project. Working with civilian employees of the center, they completed erection of this $600,000 plant in less than two weeks. The plant still stands, awaiting familiarization tours by other active and reserve Seabees.

Davisville has firmly established itself as a mobilization base and a training site for units of the RNCF. Facilities, location, access, Total Force spirit, and enthusiasm all combine to present the Navy with a valuable asset.

CDR Robert C. Edmiston, commanding officer, CBC, Davisville recognizes that active utilization of mobilization facilities assures their readiness, and he and his staff stand ready to respond to the needs of the Navy, specifically the Seabees. □

# CBC Port Hueneme enters new 'rocket' era

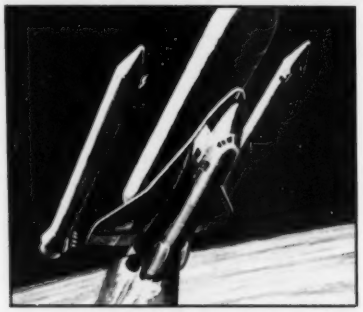
**By CONNIE LANTRIP**
*Assistant Public Affairs Officer, CBC*

It has been more than 29 years since the Construction Battalion Center at Port Hueneme was established to support Naval Construction Force around the world. Today, nearly 10,000 military and civilian personnel are assigned at the center in support of this mission.

"We had a very successful year in 1980," reported Capt. John J. Shanley, Jr., commanding officer of CBC. Citing last year's successes in reaching goals through the command's management plan, Captain Shanley continued, "We already have one of the finest enlisted dining facilities, family services centers, and recreation programs in the Navy."

Major recent accomplishments at the center include the completed design and erection of a test module for a portable 1,000-bed fleet hospital. This was completed at Twentynine Palms, Calif., and provided training for Seabees in a desert climate.

In addition, the construction equipment department, which repairs all heavy equipment on the west coast for the Navy, completed the overhaul of a 100-ton floating crane.



AFTER RETRIEVAL from coastal waters in California, the space shuttle's reusable booster rockets, shown detaching, will be towed to CBC for washdown and disassembly.

Particularly noteworthy was the savings of more than $500,000 due to energy conservation efforts at the base. A successful energy awareness week was held in 1980 to further educate employees about energy conservation techniques.

The center's data processing unit, FACSO, recently underwent modernization with the installation of a central processing unit and replacement of tapes and discs.

The center also manages an active outleasing program which currently leases more than 90 acres of land. There are 12 lessees on the center who provide jobs to nearly 800 persons from the local community, generating an annual payroll of about $18 million.

Plans to restore the historic Bard Mansion were defined and established during the year 1980. Under the leadership of historian Dr. Vince Transano, a committee is working to improve the Bard Mansion so that it will become a showplace to the public. The mansion has already been named an official historical site.

More than 38,000 visitors came to the CEC/Seabee Museum at Port Hueneme last year, where thousands of cultural and military artifacts are on view. (See page 47.)

Interfacing with the community, CBC continues to support many youth groups in sports through use of the recreation facilities on the base. Additionally, CBC provides tours free-of-charge to the public to better acquaint the local community with the center's mission.

As the United States launches into a new era with the space shuttle, so does the Construction Battalion Center. Plans have been made to use CBC as a retrieval and disassembly facility for the shuttle's solid rocket boosters. □

# Gulfport increases emphasis on training

**By ENS RODNEY D. MORTENSON, CEC, USN**
*Delta Company Commander*
*Naval Construction Training Center*

Graduation is an emotion-filled event for Class "A" school students. As new Seabees lingered in the auditorium at Naval Construction Training Center, Gulfport, their conversations were, in a sense, predictable. They compared graduation certificates, talked of seeing friends and family while on leave, anticipated reporting to new commands, and discussed future reunions.

The group also talked of pride. They were proud of having completed Class "A" school training and were equally proud to be sailors and now, full-fledged Seabees. Their pride would have been apparent if they'd not said a word; fresh haircuts, sharp uniforms and military bearing spoke for them.

The class was one of the first to benefit from the new increased emphasis on military training at the school. As part of the training the class participated in a 40-hour general military training course. This course is based on the integrated training brigade syllabus developed by the Chief of Naval Technical Training and modified to meet the needs of the Naval Construction Force.

Classroom learning is reinforced with plenty of practical application. For example, the two-hour class on uniform requirements is followed by a seabag inspection and personnel inspection in the dungaree uniform and each of the dress uniforms.

A final important, but less tangible, form of instruction remains: teaching by example. It is the responsibility of each staff member to be a living example; to maintain the highest standards of military appearance and conduct for the students' observance.

Is it working? Only the long-term performance of this class, and others to follow, will tell. □

# They work from high to low — and hot to cold

**By LT W. L. NELSON, CEC, USN**
*P.E., Va.*
*AOIC Underwater Construction Team TWO*

Underwater Construction Team Two (UCT-2) recently embarked upon a deployment cycle which will see its divers and support personnel working at sites from Diego Garcia, in the Indian Ocean, to points above the Arctic Circle and down along the California coastline.

As part of the Pacific Naval Construction Force, UCT-2 provides the fleet with underwater construction, repairs and inspections for many port and seabed facilities. This year, the 38-man (and one woman storekeeper) team will take their special diving and construction skills to more deployment sites than usual.

A 12-man detachment went to Diego Garcia last February to kick off the year's busy deployment schedule. This team provided post-construction quality assurance inspections and repairs for a $17 million fleet mooring project. This involved 11 specialized moorings with more than 3,000 tons of hardware, which had been installed using the unique construction vessel SEACON from the Chesapeake Division of the Naval Facilities Engineering Command.

UCT-2's divers inspected 17 buoys, 88 propellant embedment anchor terminations and chain components for a total of 88 mooring legs.

In late March, another team of UCT-2 divers joined the Diego Garcia crew, after stopping briefly on Midway Island to inspect its sewer outfall pipeline. The 21-man detachment then began work on the underwater portion of Diego Garcia's POL pier cathodic protection system.

The system was designed to reduce corrosion on the steel and reinforced concrete pier. This will be accomplished by providing low-voltage current from anodes to the exposed steel piles, thereby inhibiting corrosion cells.

In the operation, divers installed 84 anodes strategically throughout the piles, approximately five feet above the seafloor. Since each of the 85-pound anodes was designed to be mounted on a creosoted timber (12-by-2 inches, by 17-feet), installing the system required detailed coordination and handling.

Each timber and anode assembly was about 500 pounds buoyant, once it was placed in the water. Therefore weights were added which enabled the timber to be lowered into position by topside personnel.

On the bottom divers affixed the timbers to designated piles with U-bolt clamps. Other divers later installed the anode blocks and secured the wire-carrying PVC conduit to the piles with nylon banding.

Reference electrodes were also installed throughout the piles. Those electrodes will be used to monitor the effectiveness of the entire impressed current system.

DIVERS DRILL holes at Kamayan Point Reef, Subic Bay, using an air tracked rock drill.

A DIVER repairs a sacrificial anode continuity wire for the Diego Garcia Fleet Mooring Project.

The detachment used SCUBA gear throughout most of the pier work and mooring inspections, due to the increased mobility offered the divers. However, surface-supplied diving with MK-1 gear was used during two underwater cutting operations.

Overall, the detachment logged 323 dive sets (at least two men per set) during the two-month project. More than 300 manhours at an average depth of 68 feet were logged. This is significant when it is considered that at least 10 men topside rigging materials were required to support a single dive set.

Other UCT-2 detachments just getting underway or scheduled later in the deployment cycle are slated for projects involving inspections and demolition work in Japan, stabilization of cables on Kauai and a Guam waterfront inspection. Other detachments will be going to Truk for a sheet pile and dredging inspection and trips to the Arctic and points along the California coastline.

After completing their project on Diego Garcia in late April, the detachment flew to Subic Bay, R.P. One of the largest projects there is the installation of a new underwater waterline to Grande Island.

Emphasis at each job site continues to be the safe conduct of all diving operations while extending the Seabee "Can Do" spirit beneath the waterline. □

# CBU 403: the keyword is "training"

By LT RONALD W. HERTWIG, CEC, USN
*E.I.T., Penn.*

The Naval Academy is rich in the tradition of training midshipmen to be Naval officers. The tradition is also experienced by Construction Battalion Unit 403 in the training of Seabees. Even though the unit has a short history (CBU 403 was established November 2, 1970) it has integrated the tradition of the Naval Academy with the Seabees into its achievements.

A campground capable of supporting recreational vehicles was recently completed for use by families of midshipmen and other military personnel. The site includes 10 trailer pads (10′ × 20′) with electricity and running water, a bath house with shower facilities, a refuse station and an area for tents. The area has not only been utilized by visitors, but in a recent housing shortage, was used by military personnel awaiting regular base housing.

The major project currently under construction is a locker room at the Navy-Marine Corps Stadium. The construction consists of a building 22′ × 52′ with poured-in-place 11′ high concrete walls, associated water and electricity connections as well as finish work. This project and others have offered excellent opportunities for personnel to maintain their skills and give further experience to "A" school graduates.

MEMBERS of the builder crew pour a wall section for a locker.

A project small in scope but large in the heart of all Seabees was the construction of the Ben Moreell Memorial at the Naval Academy. The unit accomplished site preparation and constructed the grade beam on which the granite rests.

CBU 403 was involved in disaster recovery in 1979 when an unusual 20 inch snowfall paralyzed the Annapolis Navy Complex. Many duty hours above and beyond what is normally expected were performed by unit personnel for military personnel, and the nearby civilian community. Snow removal assistance to the City of Annapolis and personnel transportation services in support of Anne Arundel General Hospital were provided around the clock. This contribution has enhanced the Seabee reputation in Annapolis community as it has in other parts of the world.

Every year the military training presented in classroom instruction is put to practical use.

Classroom and practical training in land navigation is given by personnel from the local Marine Barracks. The final execution of military training is a full-scale mount-out exercise. The order to mount out is issued and around the clock preparation begins for the turnover of unit spaces to public works and to transport tools, equipment and personnel.

The key word to the CBU is training, technical and military. The establishment of CBUs has allowed Seabees on shore duty to maintain their skills through meaningful employment. The projects accomplished by CBU 403 have benefitted the unit and the Naval Academy complex. □

# Enhancing construction skills

By DAVE FRAKER

Construction Battalion Units, or CBUs, were established to enhance the Seabee construction skills when assigned to shore duty which has resulted in improved recreation, welfare, and living quarters of enlisted personnel. CBU 406, located at the Naval Air Station, Lemoore, Calif., was formed in 1970.

EO2 RICK MORGAN wears proper protection against the dust.

For more than a year the unit has been kept busy clearing fire lanes near the outside parameter of the Naval Air Station, building line shacks, and working on a pest control building.

Another project involves cleaning out a flood control culvert. This has turned into a major project involving reconstruction of four miles of drainage ditch. The "big dig," as it is called, resulted in the removal of 15,700 cubic yards of material and hauling 10,000 yards of dirt fill. Builders and steelworkers erected the line shacks while electricians and utilities personnel installed underground utilities. □

Seabee tradition

# On special assignment

**By LT. R. D. GEORGE III, CEC, USN**
*E.I.T., N.J.*

In Jacksonville, CBU-410 carefully selects its projects to ensure that they are suitable and provide the desired training. The unit supports the three local stations: NAS Jacksonville, NAS Cecil Field and NS Mayport.

Many of the projects fall into the recreation category with the construction of softball fields, basketball and volleyball courts and hobby shop facilities. Some barracks improvement and working space renovation projects have been accomplished. With the mounting problems of overaged facilities, tighter dollars and a reduced public works maintenance force, the role of CBUs in accomplishing operational projects is increasing. This alleviates the growing backlog of nondeferrable repair and provides Seabees with excellent training on projects similar to what could be expected in emergency situations. Asphalt paving, for example, has been an area that has kept equipment operators and construction mechanics busy with many new "A" school graduates learning this valuable skill.

The CBUs have also maintained the Seabee tradition of being called on for special assignments. In March 1980, CBU-410 provided personnel for an aircraft recovery team. The Seabees were charged with the erection and operation of an air transportable lifting rig which was used to remove a downed A-7 from a swamp near Valdosta, Ga. In October 1980 six men from the Jacksonville unit were selected for the Ft. Allen Task Force whose mission was to re-open and operate Ft. Allen for the resettlement of Cuban and Haitian refugees.

Close to home, CBU-410 on occasion has the opportunity to do community assistance projects, such as the relocation of recreation facilities and installation of a fire escape for the Children's Home of Florida. During the combined Armed Forces Day/Scout World '81 the unit was instrumental in constructing 200 booths for exhibits during the open house.

SEABEE testing phone exchange at Ft. Allen, Puerto Rico.

To maintain its combat readiness posture, CBU-410 spends two weeks annually in Gulfport undergoing combat skill and disaster recovery training. Embarkation exercises are also held to ensure the unit can respond to the 48-hour response requirement.

In short, CBUs are a great way for Seabees to maintain their construction skills and combat readiness skills while on shore duty. For those looking for a challenging billet where they can work in their specialized rating, CBUs are the way to go. □

# CBUs help raise morale & retention

**By EACN DEBRA S. PETERSON, USN**
*CBU-411*

A fairly recent addition to the Naval Construction Force was the establishment of the first construction battalion unit in 1969. Commonly known as CBUs, there are now 16 such units in existence.

The CBU mission is to provide a contingency construction augment capability to Naval Mobile Construction Battalions, and to ensure unit and individual skill training that is essential to the required military readiness posture.

Navy personnel have benefited in many ways from the formation of CBUs. Improvements to shore facilities through renovation and new construction focus on personnel support, welfare and recreation projects. This had contributed toward improved morale and increased retention rates.

The Self-Help programs of local shore activities receive technical assistance and on-the-job supervision when it facilitates completion of their projects. CBUs also provide recovery assistance in the event of emergency or disaster.

Finally, more meaningful shore duty is provided for Seabees with emphasis placed on military and construction skill training.

CBU-411 was established at Norfolk, Va. in 1971. This unit has made significant contributions in the responsible areas mentioned.

A recent accomplishment was the complete renovation of locker room facilities at an enlisted swimming pool. Other projects include a racquetball court, a parking lot for fleet personnel, a handicap ramp and the addition of concrete pads to park shelters.

CBU-411 also sent a five man detachment to Puerto Rico for three months during the Cuban refugee crisis. They assisted in the restoration of existing facilities for use by support personnel, and also helped construct a camp for the refugees.

Unit personnel participate in various aspects of military training. A week of field exercises along with practice at the rifle range provides practical experience in addition to classroom training.

The completion of diverse construction projects enables personnel to enhance their skills. Cross-rate training promotes more efficient use of manpower by encouraging versatility. This also contributes to more positive support between different ratings, emphasizing teamwork and famed Seabee spirit. □

# "Production without rework is our reward"

**By UT2 TOM NUGEN, USN**

Construction Battalion Unit 418 (CBU-418) was commissioned on March 1, 1979 at the Naval Submarine Base, Bangor, which is located 10 miles north of Bremerton, Wash. CBU-418 emphasizes training and quality workmanship "where production without rework is our reward."

Since its commissioning, the unit has been utilized in new construction, alterations, repairs, and nonrecurring maintenance projects in many areas of Subase Bangor, surrounding military bases, and even in the local community.

The unit's manning level stands at one Civil Engineer Corps officer and 50 enlisted personnel. Approximately half of the enlisted men are E-5 and above, with the other half consisting of junior petty officers and "A" school graduates.

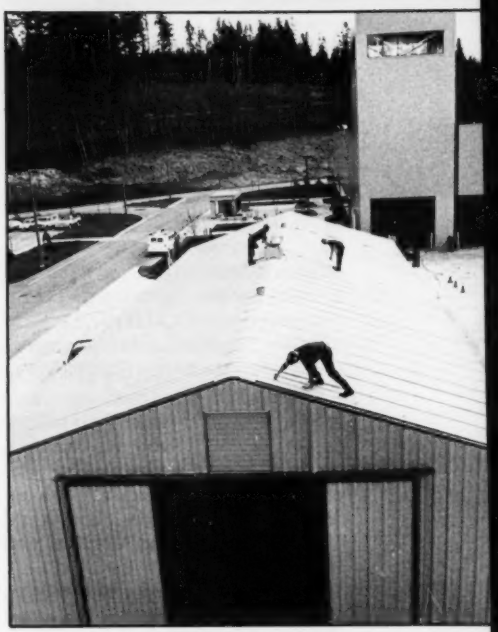
While maintaining an industrious and skillful level of professional workmanship, CBU-418 must also maintain a military preparedness posture similar to that of the naval mobile construction battalion force. The unit is trained to mount-out within 48 hours to augment military operations or function as a special disaster recovery unit. In a recent military training exercise the unit had a one hundred percent M-16 rifle qualification, of which eighty-five percent shot expert.

In less than two years the unit completed 133 projects at an estimated contractor's cost of $1,267,700. The actual cost to the Navy was substantially reduced.

CBU-418 successfully completed 40′ × 60′ pontoon barge using all welded construction and then erected a small steel hut on the barge itself; a 40′ × 100′ pre-engineered steel building was erected by members of the unit; communication tower lines were layed; soccer fields and baseball diamonds with drainage were constructed; and playground equipment was installed for base housing, a child care center, and local schools in the area.

CBU-418 is currently involved in an array of base and community projects including a recreation facility with two softball fields; 15 picnic areas complete with cooking grills; a 160′ and a 300′ communication tower; two versatile tennis/basketball courts; and the construction of office spaces for the Navy Relief Society.

Construction Battalion Unit 418 is actively supporting a vital national defense project — the Trident Submarine Program, to which the unit remains dedicated in service. □



JACKSON PARK family housing picnic tables near Erlin's Point.

PUTTING the finishing touches on the pre-engineered steel building for Trident Refit Facility.

# Individuals but part of the team!

**By LT D. K. AULT, USN**
*Commanding Officer, CBMU-302*
*E.I.T., Mich.*

Construction Battalion Maintenance Unit-302 (CBMU-302) is a one-of-a-kind organization. The 61-man unit, homeported in Subic Bay, Republic of the Philippines, is the Navy's only active facilities maintenance unit.

The mission of CBMU-302 is to provide operational and maintenance support for U.S. Navy and Marine Corps facilities in the western Pacific. Primary duty is contingency support for public works centers (PWCs) located in Subic Bay and in Yokosuka, Japan. The unit is also responsible for maintenance of Seabee Camp Jeffries in Subic Bay and Seabee Camp Cummins in Diego Garcia.

The major effort in support of the public works centers is directed toward preparedness. The unit conducts continuous training in the vital areas of utilities operation and emergency services to enable the PWCs to continue functioning in the absence of their foreign national employees.

CBMU-302's readiness test came in March of 1979 when Filipino employees at PWC Subic Bay went on strike. The unit moved in and provided the support necessary to continue essential services for several days until the labor dispute was settled.

CBMU-302 has also been called upon to provide disaster recovery support for PWC Subic Bay.

In recognition of the support rendered during emergency situations in the Subic Bay area, CBMU-302 was awarded the Meritorious Unit Citation in 1980. This award is the second of this type for the unit, the first having been presented for service in Viet Nam.

Seabee camp maintenance responsibilities may not be glamorous but they are important, especially in a harsh environment like Diego Garcia. A detachment from CBMU-302, known as Detail Paradise, has been providing continuous maintenance support for Seabee Camp Cummins since 1975.

CE3 R. N. VINLUAN opens a primary cut-out prior to working on a transformer bank as part of a project to upgrade the Diego Garcia electrical system.

UT3 C. E. PERRY works on a refrigerator. CBMU 302 Detail Diego Garcia maintains more than 200 refrigerators and 375 air conditioners.

Besides providing routine maintenance support for the camp, Detail Paradise is responsible for air conditioning, refrigeration and ice production for the Seabees. On Diego Garcia, these "luxuries" become "essentials" in the searing heat of the Indian Ocean.

Not everything about CBMU-302 is unique. Like Seabees everywhere, the "Subic Seabees" are good neighbors. The unit has been involved in several self-help projects for area commands including grading of firebreaks and access roads, clearing of drainage ditches, and repair of playground equipment. The helping hand of the Seabees also extends to the local community where the unit is presently involved in helping to construct a new orphanage.

Despite the unique organization and mission of CBMU-302, the unit takes pride in being part of the total Naval Construction Force effort in the Pacific and Indian Ocean areas. One of a kind but part of the team! □

NAVY CIVIL ENGINEER

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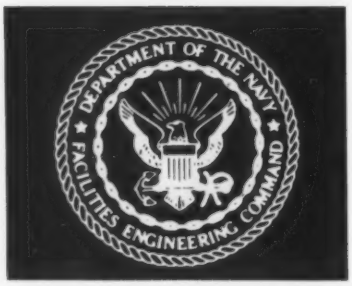


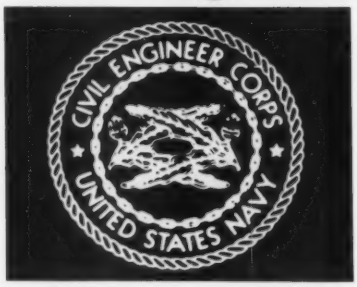


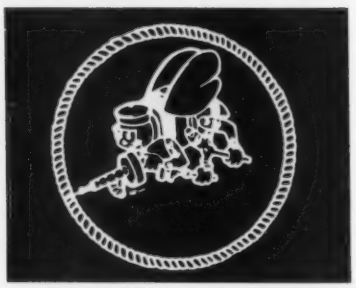

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Applicants are not limited to civil engineering but are eligible if completing degrees in *mechanical, electrical, ocean, petroleum, construction, or agricultural engineering.* Applicants enrolled in architecture must be pursuing study programs of at least five years duration in an institution accredited by the National Architectural Accrediting Board.

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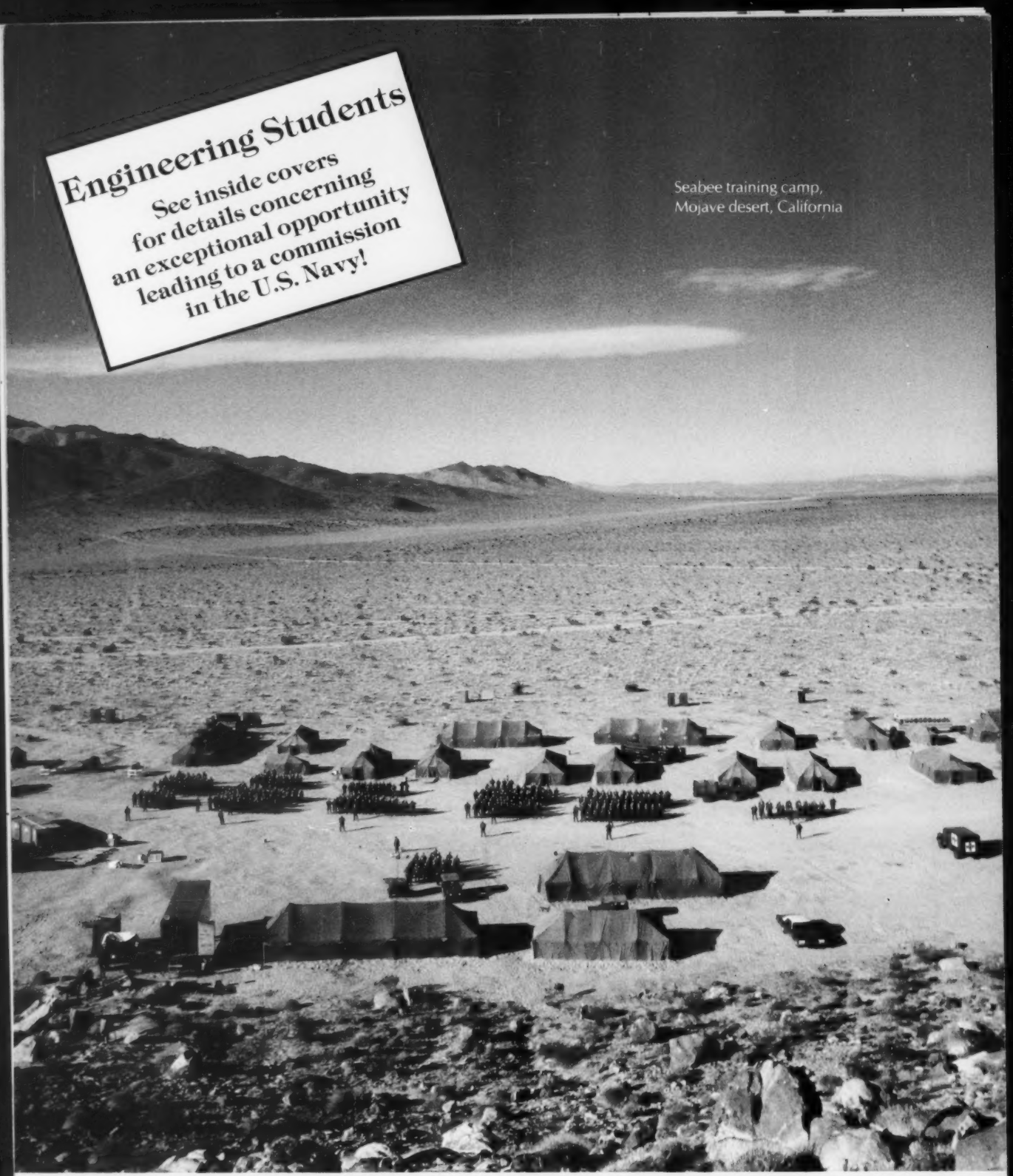


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